WOTUS Commenters as of July 11, 2017

At a glance: **19 Governors (16 individual, 4 co-signatories for WGA and NGA, Mead signing twice)**
2 Lieutenant Governors
20 Attorneys General (all signed one letter)
18 Intergovernmental Associations
61 cabinet-level state agencies

ALABAMA

Attorney General Steve Marshall
Alabama Department of Agriculture

ALASKA

Governor Bill Walker
Attorney General Jahna Lindemuth

ARIZONA

Governor Doug Ducey
Apache County, District 3
Eastern Arizona Counties Organization
Gila County Board of Supervisors (Cline)
Gila County Board of Supervisors (Humphrey)
Gila County Board of Supervisors (Martin)
**Gila County Board of Supervisors letter with 3 signatures
Graham County Board of Supervisors
Greenlee County Board of Supervisors
Navajo County Board of Supervisors (Thompson
Navajo County Board of Supervisors (Whiting)
Pima County

ARKANSAS

Governor Asa Hutchinson
Attorney General Leslie Rutledge
Arkansas Department of Agriculture
Benton County (judge)
Boone County (judge)
Carroll County (judge)

Craighead County (judge)
Faulkner County (justice of the peace)
Greene County (judge)
Hot Spring County (Dist 10 justice)
Logan County, (Dist 2 & 3 justice)
Logan County (Dist 5 justice)
Marion County (judge)
Mississippi County (judge)
Newton County (judge)
Poinsett County (judge)
Polk County (judge)
Pope County (Dist 6 & 9 justice)
Pope County (judge)
Pulaski County (justice)
Saline County (judge)
Searcy County (clerk)
Sebastian County (judge)
Sebastian County (Dist 10 justice)
Stone County (Clerk)

CALIFORNIA

Association of California Water Agencies
California Association of Sanitation Agencies
California Department of Transportation
California Storm Water Quality Association
City of Azusa (city mgr)
City of Corona (city mgr)
City of Lake Forest (env. mgr)
City of Manteca (mayor)
City of San Juan Capistrano (city mgr)
City of Santa Ana (engineer)
Del Norte County Board of Supervisors
Elsinore Valley Municipal Water District
La Mesa (Helix) Water District
Los Angeles County Department of Public Works
Orange County Public Works
Riverside County Flood Control District
Rural County Representatives of California
San Diego County Water Authority
San Diego County Planning and Development Services
San Gabriel Valley Council of Governments
Sanitation Districts of Los Angeles County
Santa Fe Irrigation District
Santa Margarita Water District
Tuolumne County Board of Supervisors
Western Municipal Water District

COLORADO

**Joint letter: Colorado Department of Agriculture
Colorado Department of Natural Resources
Colorado Department of Public Health and Environment
City of Aurora Water Administration
Huerfano County Water Conservation District
Northwest Colorado Council of Governments
Pitkin County (attorney)

CONNECTICUT

Connecticut Department of Energy and Environmental Protection

FLORIDA

Florida Department of Agriculture and Consumer Services
Florida Department of Environmental Protection
Charlotte County Board of Commissioners

GEORGIA

Attorney General Christopher Carr
Georgia Department of Natural Resources

HAWAII

Governor David Ige

IDAHO

Governor Butch Otter **joint letter with
Idaho Department of Agriculture
Idaho Department of Environmental Quality
Idaho Department of Water Resources
Idaho Association of Counties

ILLINOIS
Illinois Environmental Protection Agency

INDIANA

Attorney General Curtis Hill, Jr.
Indiana Department of Environmental Management
Association of Indiana Counties
County Supervisors Association of Indiana
Blackford County Surveyors
Hamilton County Surveyors
Hancock County Surveyors

IOWA

Governor Kim Reynolds **joint letter with Lt. Governor Adam Gregg
Buchanan County

KANSAS

Governor Sam Brownback
Attorney General Derek Schmidt

KENTUCKY

Attorney General Andy Beshear
Energy and Environment Cabinet (Secretary)

LOUISIANA

Attorney General Jeff Landry
Louisiana Department of Environmental Quality (Secretary)
Jefferson Parish Department of Environmental Affairs

MAINE

Governor Paul LePage

MASSACHUSETTS

Massachusetts Department of Environmental Protection

MICHIGAN

Attorney General Bill Schuette
**Joint letter: Michigan Department of Agriculture and Rural Development and
Michigan Department of Environmental Quality

MINNESOTA

**Joint letter: Minnesota Department of Natural Resources
Minnesota Pollution Control Agency

MISSISSIPPI

Governor Phil Bryant
Forrest County (supervisor)

MISSOURI

Governor Eric Greitens **joint letter with
Missouri Department of Natural Resources
Attorney General Josh Hawley

MONTANA

Montana Department of Environmental Quality, Department of Natural Resources and Conservation

NEBRASKA

Governor Pete Ricketts **joint letter with
Nebraska Department of Agriculture
Nebraska Department of Environmental Quality
Nebraska Department of Natural Resources

NEVADA

Governor Brian Sandoval
Attorney General Adam Paul Laxalt
Nevada Division of Environmental Protection

Nevada Association of Counties
Clark County Regional Flood Control District
Humboldt River Basin Authority

NEW HAMPSHIRE

Governor Chris Sununu

NEW MEXICO

New Mexico Department of Agriculture

NEW YORK

New York State Department of Environmental Conservation

NORTH CAROLINA

Lieutenant Governor Dan Forest
North Carolina Department of Environmental Quality (Secretary)

NORTH DAKOTA

Governor Doug Burgum
Attorney General Wayne Stenehjem

OHIO

Attorney General Mike DeWine
Ohio Environmental Protection Agency
Ohio Department of Transportation
Ohio Department of Agriculture
    Ohio Department of Natural Resources, Division of Mineral Resources
    Ohio Department of Natural Resources, Division of Oil and Gas Resources Management

OKLAHOMA

Attorney General Mike Hunter
**Joint letter: Commissioner of Agriculture
Secretary of Energy and Environment
Secretary of Transportation

OREGON

**Joint letter	Oregon Department of Environmental Quality
Oregon Department of Fish and Wildlife
Oregon Department of Forestry
Oregon Department of State Lands
Jackson County Road Department
Yamhill County Commission

PENNSYLVANIA

**Joint letter:	Pennsylvania Department of Agriculture
Pennsylvania Department of Conservation and Natural Resources
Pennsylvania Department of Environmental Protection
Pennsylvania Fish and Boat Commission
Pennsylvania Department of Transportation (nat res. staff)

SOUTH CAROLINA

Governor Henry McMaster
Attorney General Alan Wilson
Dorchester County Administrator

SOUTH DAKOTA

Attorney General Marty Jackley
South Dakota Department of Environment and Natural Resources
Pennington County Board of Commissioners

TENNESSEE

**Joint letter:	Tennessee Department of Agriculture and
Tennessee Department of Environment and Conservation

TEXAS

Attorney General Ken Paxton
Railroad Commission of Texas (All three commissioners)
Texas Commission on Environmental Quality
Texas Department of Agriculture
Texas Department of Transportation

Texas General Land Office

UTAH

Attorney General Sean Reyes
Public Lands Policy Coordination Office (director)
Duchesne County Commission

VIRGINIA

Commonwealth of Virginia Department of Agriculture and Consumer Services
Spotsylvania County (engineer)

WASHINGTON

Washington Department of Ecology

WEST VIRGINIA

Attorney General Patrick Morrisey
West Virginia Department of Environmental Protection

WISCONSIN

Attorney General Brad Schimel
Wisconsin Department of Natural Resources

WYOMING

Governor Matt Mead **Signed own letter for WY and co-signed NGA leadership letter with Brown (CA)
Wyoming Association of Conservation Districts
Wyoming County Commissioners Association
Wyoming Department of Environmental Quality
Wyoming Coalition of Local Governments

INTERGOVERNMENTAL ASSOCIATIONS

****Joint Letter from the National Association of Counties, National League of Cities, U.S. Conference of Mayors**

Association of Clean Water Administrators
Association of State Floodplain Managers
Association of State Wetland Managers
Environmental Council of the States
National Association of Conservation Districts
National Association of Clean Water Agencies
National Association of State Departments of Agriculture
National Association of Flood and Stormwater Management Agencies
National Conference of State Legislatures
National Governors' Association – Gov. Edmund Brown (CA) and Gov. Matt Mead (WY)
National Municipal Storm Water Alliance
National Water Resources Association
New England Interstate Water Pollution Control Commission
Western Governors' Association – Gov. Steve Bullock (MT) and Gov. Dennis Daugaard (SD)
Western States Water Council

****Joint Letter signed by Attorneys General from 20 states**

Message

From:	Grantham, Nancy [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=12A3C2ED7158417FB0BB1B1B72A8CFB0-GRANTHAM, NANCY]
Sent:	12/8/2017 8:44:07 PM
To:	Bowman, Liz [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=c3d4d94d3e4b4b1f80904056703ebc80-Bowman, Eli]
CC:	Grantham, Nancy [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=12a3c2ed7158417fb0bb1b1b72a8cfb0-Grantham, Nancy]
Subject:	final superfund national release is out
Attachments:	XSEL 12.8.17 draft final 10.21 am regional order.xlsx

See attached list of sites that is linked from the press release.

21 individual releases going out from the regions

Thanks ng

Nancy Grantham
Office of Public Affairs
US Environmental Protection Agency
202-564-6879 (desk)
Ex. 6 - Personal Privacy **(mobile)**

CONTACT: press@epa.gov

EPA Releases List of Superfund Sites Targeted for Immediate, Intense Attention

WASHINGTON - Today, the U.S. Environmental Protection Agency released the list of Superfund sites that Administrator Pruitt has targeted for immediate and intense attention. The 21 sites on the list - from across the United States - are in direct response to the Superfund Task Force Recommendations, issued this summer, calling for this list.

"By elevating these sites we are sending a message that EPA is, in fact, restoring its Superfund program to its rightful place at the center of the Agency's mission," **said EPA Administrator Scott Pruitt**. "Getting toxic land sites cleaned up and revitalized is of the utmost importance to the communities across the country that are affected by these sites. I have charged the Superfund Task Force staff to immediately and intently develop plans for each of these sites to ensure they are

thoughtfully addressed with urgency. By getting these sites cleaned up, EPA will continue to focus on ways we can directly improve public health and the environment for people across America."

In developing this initial list, EPA considered sites that will benefit from Administrator Pruitt's direct engagement and have identifiable actions to protect human health and the environment. These are sites requiring timely resolution of specific issues to expedite cleanup and redevelopment efforts. The list is designed to spur action at sites where opportunities exist to act quickly and comprehensively. The Administrator will receive regular updates on each of these sites.

The list is intended to be dynamic. Sites will move on and off the list as appropriate. At times, there may be more or fewer sites based on where the Administrator's attention and focus is most needed. There is no commitment of additional funding associated with a site's inclusion on the list.

EPA remains dedicated to addressing risks at all Superfund sites, not just those on the list. The Task Force Recommendations are aimed at expediting cleanup at all Superfund sites and Administrator Pruitt has set the expectation that there will be a renewed focus on accelerating work and progress at all Superfund sites across the country.

The Task Force, whose work is ongoing, has five overarching goals:

- Expediting cleanup and remediation;
- Reinvigorating cleanup and reuse efforts by potentially responsible parties;
- Encouraging private investment to facilitate cleanup and reuse;
- Promoting redevelopment and community revitalization; and
- Engaging with partners and stakeholders.

The Task Force will provide the public with regular updates as it makes progress on the Administrator's Emphasis list and other Task Force activities

The list of sites can be found here.

US EPA Superfund Task Force: Superfund Sites Targeted for Immediate, Intense Action - December 8, 2017

Site	Reg	City
Mohawk Tannery	1	Nashua
Centredale Manor Restoration Project	1	North Providence
American Cyanamid Co.	2	Bound Brook
Diamond Alkali Co. (aka Upper Lower Passaic)	2	Newark
Ventron/Velsicol (aka Berry's Creek)	2	Wood Ridge Borough
L. A. Clarke & Son	3	Spotsylvania
B.F. Goodrich	4	Calvert City
Mississippi Phosphates Corporation	4	Pascagoula
U.S. Smelter and Lead Refinery, Inc. (aka USS Lead or East Chicago)	5	East Chicago
Allied Paper, Inc./Portage Creek/Kalamazoo River	5	Kalamazoo
Tar Creek (Ottawa County)	6	Ottawa County
San Jacinto Waste Pits	6	Channelview
Des Moines TCE (aka Dico Company)	7	Des Moines
West Lake Landfill	7	Bridgeton
Bonita Peak Mining District	8	San Juan County
Anaconda Co. Smelter	8	Anaconda

State	NPL	Issue/Upcoming Milestone
New Hampshire	P	Finalize Non-Time Critical Removal Action and facilitate redevelopment with interested developers.
Rhode Island	F	On the NPL for an extended period of time. Litigation with Potentially Responsible Party has delayed implementation of the remedy.
New Jersey	F	Issue Proposed Plan for public comment.
New Jersey	F	Finalize the Remedial Investigation and consider taking early actions.
New Jersey	F	Issue Proposed Plan for public comment.
Virginia	F	On the NPL for an extended period of time. Dispute with Potentially Responsible Party regarding OU2 work plan for groundwater. Need resolution on issue to determine if party will perform work, or if formal dispute resolution is invoked.
Kentucky	F	Proposed remedy out for comment. Comments will be considered and addressed in the Record of Decision.
Mississippi	P	Potential release of hazardous waste to environmentally sensitive area/NPL listing for remedial takeover.
Indiana	F	In Operable Unit 1-Zone 1 land use decision/Proposed Plan release. Complete all soil remediation in Operable Unit 1-Zones 2 and 3.
Michigan	F	Remedial Investigation/Feasibility Study delays caused by litigation. Resolve issues expeditiously.
Oklahoma	F	Long term stewardship/Implement institutional controls to protect cleanup.
Texas	F	Initiate and complete Remedial Design/Remedial Action negotiations and sign Consent Decree.
Iowa	F	Delayed by litigation. Initiate actions to allow revitalization of the site.
Missouri	F	Develop a preferred alternative and issue Proposed Plan.
Colorado	F	Remediation plan with short- and long-term objectives.
Montana	F	Initiate and complete negotiations to begin implementation of early actions to address human health exposure, followed by site wide work.

Silver Bow Creek/Butte Area	8	Butte
Orange County North Basin	9	Fullerton
Anaconda Copper Mine	9	Yerington
Portland Harbor	10	Portland
Quendall Terminal	10	Renton

NPL Status codes
Pre-NPL = Under consideration to be proposed to the NPL
P = Proposed to the NPL
F = Final on the NPL
D = Deleted from the Final NPL

Montana	F	Administrator's site visit pending in 2018. State disagreement with Potentially Responsible Party on implementation of the remedy. Region facilitating discussions to reach agreement to implement remedy.
California	Pre-NPL	Basin-wide groundwater cleanup needed quickly to protect drinking water for millions of Californians/NPL proposal, then listing.
Nevada	P	State request for deferral of final NPL listing decision. Pursue agreement on deferral decision.
Oregon	F	Negotiating multiple agreements for design of cleanup and baseline sampling.
Washington	F	Substantial redevelopment opportunity. Determine preferred alternative and issue the Proposed Plan for public comment.

Message

From: Love, Kelly A. EOP/WHO [Ex. 6 - Personal Privacy]
Sent: 7/18/2017 10:31:11 PM
To: Bowman, Liz [Bowman.Liz@epa.gov]
CC: Dorr, Kaelan K. EOP/WHO [Ex. 6 - Personal Privacy]; Rateike, Bradley A. EOP/WHO [Ex. 6 - Personal Privacy]
Subject: FW: HuffPost: Senator Joins Ethics Probe That Could Get EPA Chief Scott Pruitt Disbarred

Hi All – Do we have talkers on this below?

Senator Joins Ethics Probe That Could Get EPA Chief Scott Pruitt Disbarred
HuffPost
Alexander C. Kaufman
July 18, 2017 – 10:56 AM
>http://www.huffingtonpost.com/entry/scott-pruitt-ethics-probe_us_596cf43ce4b0e983c05800ed?ncid=engmodushpmg00000004<

The former Oklahoma attorney general is under investigation for misleading Congress about his emails.

Environmental Protection Agency Administrator Scott Pruitt has been caught repeatedly misleading Congress about his use of different email accounts during his six years as Oklahoma's attorney general.

He said he used just one email, when he actually had two. He sent official correspondence from a personal address, and appeared to deliberately delay public-records requests to cover his tracks before facing a Senate confirmation hearing.

Now, a senator involved in that confirmation process is backing an effort that could get Pruitt disbarred in his home state, Oklahoma, for violating ethics rules.

Sen. Sheldon Whitehouse (D-R.I.) plans to submit a lengthy statement and 60 pages of evidence to the Oklahoma Bar Association on Tuesday for its investigation into Pruitt, whom he accuses of lying to him during and after the hearing before the Senate Environment and Public Works Committee. The bar association began probing Pruitt in March in response to an ethics complaint filed by an environmental group and a University of Oklahoma law professor.

Whitehouse, in a letter provided to HuffPost before he submitted it to the bar association, says Pruitt's "misleading answers, evasiveness, and stonewalling" prevented lawmakers from fully vetting the candidate before advancing his nomination for a Senate confirmation vote.

"I have had a front-row seat for Mr. Pruitt's misleading testimony and his ongoing failure to respond completely and truthfully to Committee requests for him to set the record straight," Whitehouse wrote in the letter, addressed to bar association general counsel Gina Hendryx. "This conduct is unbecoming of an attorney who is also a public official and who, under law, is required to testify truthfully to Congress."

Pruitt's deep ties to fossil fuel industries whose pollution he's now charged with policing became a lightning rod during his confirmation process. Correspondence published by The New York Times in 2014 as part of a Pulitzer Prize-winning series showed Pruitt allowing lawyers from Devon Energy, an oil and gas company, to write a complaint to the EPA under his official letterhead. Since taking office, Pruitt has spent an unusual amount of time courting fossil fuel executives amid aggressive rollbacks of regulations and programs to address climate change.

His failure provide accurate testimony on his email use fuels concerns that he misled lawmakers to obscure his push to boost oil and gas profits ahead of public health. If he is found guilty of violating rules, the bar association could choose to sanction Pruitt, suspend his license or, in the most severe scenario, disbar him for at least five years.

It’s unclear how disbarment would affect his job as EPA administrator.

“He misstated the facts over and over again,” Whitehouse told HuffPost in a phone interview on Monday. “This was a case of repeat prevarications, not just an inadvertent slip.”

During his first appearance before Congress in January, Pruitt claimed he never used his personal email address for official business. He told Whitehouse that there were “no other email addresses.” After the hearing, he confirmed the statement, telling Whitehouse: “I have used two email addresses since becoming attorney general of Oklahoma. I use a personal email address for personal email, and an official email address for official business. The domain of my personal email address is me.com and the domain for my official email address is oag.ok.gov.”

On Feb. 21, four days after he the Senate narrowly confirmed his nomination, the Oklahoma attorney general’s office released 7,564 pages of Pruitt’s emails under court order following a lawsuit from the nonprofit Center for Media and Democracy. The correspondence showed Pruitt using his personal email for official purposes, contradicting his testimony.

In June, the second cache of emails handed over to the Wisconsin-based watchdog group revealed that Pruitt used two addresses for the Oklahoma attorney general’s office: scott.pruitt@oag.ok.gov, and esp@oag.ok.gov. The latter, as The Washington Post noted, used the initials for Pruitt’s full name, Edward Scott Pruitt.

Whitehouse said Pruitt stonewalled efforts to make the emails public under Oklahoma’s Open Records Act. In the five months after Mike Hunter, Pruitt’s successor, took over, his office cleared a backlog of open-records requests that dated back to 2014.

The EPA did not respond to a request for comment on Monday.

“Somebody needs to hold Scott Pruitt to account or at least investigate some of the questions that remain on his record during his time as Oklahoma attorney general,” Nick Surgey, research director at the Center for Media and Democracy, told HuffPost by phone. “There were many questions that were asked during his confirmation hearing that should have been answered but they weren’t.”

John Williams, executive director of the Oklahoma Bar Association, declined to comment on the status of the investigation, but said it could be many months before it concludes.

“It can be a fairly elaborate and lengthy process,” Williams told HuffPost. In anticipation of Whitehouse’s submission, he said: “I assume that would cause the investigation to go on longer.”

If the bar association concludes that Pruitt violated ethics rules, the case is turned over to a committee that determines whether charges should be filed, and a special tribunal responsible for holding hearings. Ultimately, the state Supreme Court reviews the investigation.

The ethics complaint could provide legal ammunition for other challenges to Pruitt’s regulatory agenda. Whitehouse said lawsuits opposing EPA rollbacks of rules on oil and gas companies could go after Pruitt for alleged conflicts of interest.

“It’s regrettable that these steps have to be taken about somebody who has been shoved into a Cabinet-level position in the government of the United States of America,” Whitehouse said. “But that’s the world under Trump.”

Message

From: Konkus, John [konkus.john@epa.gov]
Sent: 1/10/2018 8:26:08 PM
To: Bowman, Liz [Bowman.Liz@epa.gov]; Ferguson, Lincoln [ferguson.lincoln@epa.gov]; Wilcox, Jahan [wilcox.jahan@epa.gov]; Abboud, Michael [abboud.michael@epa.gov]; Hewitt, James [hewitt.james@epa.gov]; Daniell, Kelsi [daniell.kelsi@epa.gov]; Block, Molly [block.molly@epa.gov]
Subject: WH Reports
Attachments: 2018-01-10 EPA Report for WH Comms Planning.docx; Daily Communications Report 01_10_18.docx

Team: Attached are the weekly and daily reports. I plan to send them at 5pm. Thanks!

John Konkus
Environmental Protection Agency
Deputy Associate Administrator for Public Affairs
Mobile: (202) 365-9250

Ex. 5 - Deliberative Process

Ex. 5 - Deliberative Process

Miami News Record: Tar Creek Superfund Site Makes Pruitt's Priority List

Ex. 5 - Deliberative Process

Message

From: Konkus, John [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=555471B2BAA6419E8E141696F4577062-KONKUS, JOH]
Sent: 8/14/2017 9:46:54 PM
To: Grantham, Nancy [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=12a3c2ed7158417fb0bb1b1b72a8cfb0-Grantham, Nancy]
CC: Bowman, Liz [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=c3d4d94d3e4b4b1f80904056703ebc80-Bowman, Eli]
Subject: Re: ACTION: Tar Creek tour Press Release--DRAFT

Ex. 5 - Deliberative Process

John Konkus
Environmental Protection Agency
Deputy Associate Administrator for Public Affairs
Mobile: Ex. 6 - Personal Privacy

On Aug 14, 2017, at 5:26 PM, Grantham, Nancy <Grantham.Nancy@epa.gov> wrote:

Ex. 5 - Deliberative Process

Region 6 drafted the below.

Please let us know your thoughts.

Thanks ng

Nancy Grantham
Office of Public Affairs
US Environmental Protection Agency
202-564-6879 (desk)
Ex. 6 - Personal Privacy (mobile)

-----Original Message-----
From: Gray, David
Sent: Monday, August 14, 2017 5:11 PM
To: Grantham, Nancy <Grantham.Nancy@epa.gov>; Kelly, Albert <kelly.albert@epa.gov>; Coleman, Sam <Coleman.Sam@epa.gov>
Subject: Fwd: ACTION: Tar Creek tour Press Release--DRAFT

Ex. 5 - Deliberative Process

Ex. 5 - Deliberative Process

-----Original Message-----

From: Gray, David

Sent: Monday, August 14, 2017 10:35 AM

To: Durant, Jennah <Durant.Jennah@epa.gov>; Taheri, Diane <Taheri.Diane@epa.gov>; Bokun, Lisa <Bokun.Lisa@epa.gov>; Martindale, Cary <martindale.cary@epa.gov>

Subject: Press Release

Jennah - hq would like to put out a press release on Albert Kelley's trip to Tar Creek today. Can you get with Carey and write something up. They are sending me pictures. They would like for it to go today. Thanks

David

Sent from my iPhone

<Tar Creek tour.docx>

Message

From: Grantham, Nancy [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=12A3C2ED7158417FB0BB1B1B72A8CFB0-GRANTHAM, NANCY]
Sent: 8/14/2017 9:26:11 PM
To: Konkus, John [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=555471b2baa6419e8e141696f4577062-Konkus, Joh]; Bowman, Liz [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=c3d4d94d3e4b4b1f80904056703ebc80-Bowman, Eli]
Subject: FW: ACTION: Tar Creek tour Press Release--DRAFT
Attachments: Tar Creek tour.docx

Ex. 5 - Deliberative Process

Region 6 drafted the below.

Please let us know your thoughts.

Thanks ng

Nancy Grantham
Office of Public Affairs
US Environmental Protection Agency
202-564-6879 (desk)
Ex. 6 - Personal Privacy (mobile)

-----Original Message-----
From: Gray, David
Sent: Monday, August 14, 2017 5:11 PM
To: Grantham, Nancy <Grantham.Nancy@epa.gov>; Kelly, Albert <kelly.albert@epa.gov>; Coleman, Sam <Coleman.Sam@epa.gov>
Subject: Fwd: ACTION: Tar Creek tour Press Release--DRAFT

Ex. 5 - Deliberative Process

>
>
> -----Original Message-----
> From: Gray, David

> Sent: Monday, August 14, 2017 10:35 AM
> To: Durant, Jennah <Durant.Jennah@epa.gov>; Taheri, Diane <Taheri.Diane@epa.gov>; Bokun, Lisa <Bokun.Lisa@epa.gov>; Martindale, Cary <martindale.cary@epa.gov>
> Subject: Press Release
>
> Jennah - hq would like to put out a press release on Albert Kelley's trip to Tar Creek today. Can you get with Carey and write something up. They are sending me pictures. They would like for it to go today. Thanks
>
> David
>
>
> Sent from my iPhone

U.S. ENVIRONMENTAL PROTECTION AGENCY

NEWS RELEASE

WWW.EPA.GOV/NEWSROOM

EPA and Tribal Officials Tour Tar Creek Superfund Site

Ex. 5 - Deliberative Process

Connect with EPA Region 6:
On Facebook: https://www.facebook.com/eparegion6
On Twitter: https://twitter.com/EPAregion6
Activities in EPA Region 6: https://www.epa.gov/aboutepa/epa-region-6-south-central

# # #

Message

From: White House Press Office [whitehouse-noreply@messages.whitehouse.gov]
Sent: 4/5/2018 7:32:42 PM
To: Bowman, Liz [Bowman.Liz@epa.gov]
Subject: President Donald J. Trump's Leadership on the Economy is Making A Difference For All Americans

THE WHITE HOUSE
Office of the Press Secretary

FOR IMMEDIATE RELEASE
April 5, 2018

PRESIDENT DONALD J. TRUMP'S LEADERSHIP ON THE ECONOMY IS MAKING A DIFFERENCE FOR ALL AMERICANS

"This is our new American moment. There has never been a better time to start living the American Dream."
– President Donald J. Trump

THE ECONOMY IS BOOMING: The economy is expanding rapidly under President Donald J. Trump's leadership.

- American optimism and excitement about the economy is growing under President Trump's leadership.
  - According to Pew Research, Americans rating the economy good to excellent surged to 53 percent, the highest point in 18 years.
  - According to Gallup, worry about the economy has dropped 37 percent from its high of 71 percent in 2011 and 2012. One-third of that decline has occurred in the past year.
- The United States economy continues to expand at better-than-expected rates.
  - Department of Commerce figures released mid-March show the economy grew at an annual rate of 2.9 percent during the final three months of 2017, which beat their prior estimate of 2.5 percent.
  - The monthly Employment Situation Report from the Bureau of Labor Statistics (BLS) released in March shows that nonfarm payroll employment rose by 313,000 in February. The average job numbers in 2018 are the strongest since 1997.
  - The economy grew at an annual rate of 3.1 percent over the past three quarters.
  - Since January 2017, over 2.5 million jobs have been added to the economy.
- Unemployment has dropped to its lowest levels since before the Great Recession and wages are rising.
  - Recent data shows the number of Americans filing for unemployment benefits dropped to more than a 45-year low in mid-March.
  - The Department of Labor data from February shows a 4.1 percent unemployment rate, which is a 17-year low.
  - In February, average hourly earnings rose to $26.75, continuing record gains made in 2018.
  - According to Gallup, the percentage of Americans now worried about unemployment is down 36 percentage points from the high of 59 percent in 2010, including a seven-point decline in the past year.

TAX CUTS ARE MAKING A DIFFERENCE IN WEST VIRGINIA AND BEYOND: Americans are seeing the benefits of President Trump's tax cuts.

- President Trump's tax cuts are the biggest gross tax cuts in American history, with $5.5 trillion in gross tax cuts over ten years and $4.5 trillion in reforms.
- Since President Trump provided his historic tax cuts, more than 460 businesses have announced new investments, raises, bonuses, or increased retirement benefits, helping more than 5.4 million workers.
  - According to the Ernst & Young Tax Reform Dollar Deployment Survey, 89 percent of companies plan to enhance compensation due to the new tax reform law.
- Americans are beginning to see the impact of tax cuts on every paycheck.
  - In February, the IRS updated withholding tables for payroll calculations, meaning 90 percent of Americans are now getting bigger paychecks and more take-home pay.
  - The tax reform package lowered individual tax income rates, nearly doubled the standard deduction, and doubled the child tax credit.
- Thousands of West Virginians are receiving bonuses or pay increases due to tax reform. Some companies that have announced bonuses or pay increases include:
  - Worldwide Equipment in White Sulphur Springs, WV which announced that it will provide bonuses for its 1,100 employees, because of tax reform;
  - Citizens Bank of West Virginia which issued a 'Tax Cut Bonus' of $1,000 to each of its 66 employees; and
  - Walmart, who issued bonuses in West Virginia totaling over $5 million. Walmart also announced pay raises that would impact well over 5,500 employees in the state.
- West Virginians will see significant impacts from President Trump's tax cuts.
  - West Virginia State Auditor, John B. McCuskey, expects West Virginians State employees to collectively save $50 million due to the Tax Cuts and Jobs Act.
  - According to the Department of the Treasury, West Virginian families will receive an average tax cut of $1,200 just this year alone.

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Message

From: White House Press Office [whitehouse-noreply@messages.whitehouse.gov]
Sent: 4/5/2018 6:14:53 PM
To: Bowman, Liz [Bowman.Liz@epa.gov]
Subject: Tax Reform Is Paying Off for Workers and Businesses in West Virginia and Around the Country

THE WHITE HOUSE
Office of the Press Secretary

FOR IMMEDIATE RELEASE
April 5, 2018

TAX REFORM IS PAYING OFF FOR WORKERS AND BUSINESSES IN WEST VIRGINIA AND AROUND THE COUNTRY

In West Virginia today, President Trump is meeting with workers and businesses who are seeing the benefits of tax reform, just a few of the millions of Americans who are benefiting from new investment, bonuses, and hiring across the Nation.

THE INTER-MOUNTAIN (ELKINS, WEST VIRGINIA): Citizens Bank Gives Bonuses to Employees

"Citizens Bank of West Virginia issued a bonus of $1,000 to each of its 66 employees recently, joining a number of U.S. companies to pass along savings from the federal tax reform to its staff…. 'One of the best investments we can make is in our employees who are dedicated to making sure our customers have great banking experiences at Citizens,' said Nathaniel S. Bonnell, president and CEO. 'This $66,000 investment demonstrates our thanks and appreciation to our team for their tireless efforts and commitment to the bank.'"

WEST VIRGINIA METRONEWS: Pence Talks Tax Reform, Applauds Worldwide Equipment Announcement in White Sulphur Springs

"Before Pence took the stage, Worldwide Equipment CEO Terry Dotson made a highly anticipated announcement…. The company's roughly 1,100 employees across their 20 locations have received bonuses, a dealership will be constructed in Charleston, SC and upgrades are coming to their existing facilities. Dotson is confident these accomplishments are a result of the recently-passed tax reform plan."

WV NEWS: W.Va. State Auditor: Tax Cuts to Save State Employees Collective $50 Million per Year

"State employees in West Virginia are collectively expected to keep an additional $50 million annually, according to State Auditor John B. 'JB' McCuskey. McCuskey attributed this savings to the passage of the Tax Cuts and Jobs Act, which will provide state employees with a reduction in their tax withholding."

WASHINGTON EXAMINER: GOP Tax Overhaul Will Cut Taxes for Two-Thirds of Households this Year: Analysis

"The new tax law will directly cut the taxes of nearly two-thirds of households this year, according to a new analysis released Wednesday by the nonprofit Tax Policy Center. The think tank found the individual provisions of the law signed by President Trump in December will reduce taxes for 65 percent of households in 2018…"

MARKETWATCH: Crumbs? Bonuses Tied to Trump Tax Cuts Said to Boost U.S. Incomes by $30 Billion

"Democratic leader Nancy Pelosi said ordinary Americans would only get 'crumbs' from the Trump cuts. The federal agency that does the math says those crumbs amounted to as much as $30 billion in January. The Bureau of Economic Analysis raised its estimate of how much U.S. incomes rose in the first month of the year in response to widespread reports of businesses handing out onetime bonuses after the tax cuts became law."

THE ASSOCIATED PRESS: McCormick Offers Employee Bonuses on Tax Cut Benefit

"McCormick & Co. is the latest company to offer employees bonuses, citing sweeping tax reforms that slashed corporate tax rates. The spice-maker is offering $1,000 bonuses to eligible hourly employees and says it plans to 'accelerate' wage increases, though it did not provide details. The Sparks, Maryland company will also [use] the tax cut to make investments, pay debt and benefit shareholders."

MILWAUKEE JOURNAL SENTINEL: Lower Corporate Tax Rate Projected To Save Wisconsin Utility Customers More Than $275 Million

"Customers of Wisconsin utilities are projected to save more than $275 million from the new lower rate for federal corporate taxes, based on estimates compiled by the Citizens Utility Board of Wisconsin and the Wisconsin Industrial Energy Group…. Projected taxes are included as an expense when setting utility rates and the cost is passed onto customers."

ATLANTA BUSINESS CHRONICLE: Southwire to Pay Workers $9 Million in Bonuses, Benefits Thanks to Tax Reform

"Electrical wire giant Southwire said Monday it will pay out $9 million in bonuses and benefits to employees thanks to tax reform. Carrollton, Ga.-based Southwire Co. said full-time employees in the United States, not including executives and upper management, will each receive a $1,000 bonus and full-time employees outside of the U.S. will receive an equivalent supplement. Part-time employees will get $250 bonuses or an international equivalent. The majority of Southwire's nearly 7,500 employees will receive payments, the company said."

KENT COUNTY NEWS (CHESTERTOWN, MARYLAND): Tax Cuts Lead Dixon to Give Employee Bonuses

"Dixon Valve and Coupling Co. has announced that it is giving employees $1,000 bonuses thanks to the federal tax reform.… On March 14, Dixon announced a $1,000 bonus for each full-time American employee who had been with the company for a year 'as a direct result of the new tax law and reduced regulations'…"

WICHITA BUSINESS JOURNAL: Wichita Companies 'Reinvesting' In Employees through Tax Cut Bonuses

"Aldrich, president and CEO of Wichita Railway Services, provided his employees bonuses of $3,000 to $6,000 using funds that would have otherwise gone toward corporate income tax. The federal government's Tax Cuts and Jobs Act, signed into law in December, lowered tax rates for businesses and individuals."

SPRINGFIELD NEWS-LEADER (MISSOURI): Springfield Solar Company Hiring More Workers, Credits Trump's Tax Cut

"A Springfield solar company announced Monday it's adding 30 new jobs thanks to a corporate tax rate cut championed by President Donald Trump. According to a press release, Sun Solar employed about 100 people at the start of 2018, 17 percent of whom are U.S. military veterans. "

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Message

From: White House Press Office [whitehouse-noreply@messages.whitehouse.gov]
Sent: 12/12/2017 6:44:34 PM
To: Bowman, Liz [Bowman.Liz@epa.gov]
Subject: ICYMI: State and Local Leaders Push for Tax Reform

THE WHITE HOUSE
Office of the Press Secretary

FOR IMMEDIATE RELEASE
December 12, 2017

State and Local Leaders Push for Tax Reform

Reforming our outdated, complex, and overly burdensome tax code and cutting taxes for hardworking families has the critical support of State and local officials across the country. As Congress works to have a bill on President Donald J. Trump's desk before the end of the year, a majority of governors have indicated their support for tax reform and 21 governors recently signed a letter to congressional leadership supporting the effort. The governors urge the two chambers to swiftly pass meaningful tax reform legislation, writing, "We've proven in our states that you can cut taxes, create jobs, and generate budget surpluses all at the same time. If it can work in our states, it can work for America."

GOVERNORS

Governor Doug Ducey (R, AZ): "Make no mistake, special interests will fight like crazy to keep their loopholes and special treatment. But government shouldn't be in the business of picking winners and losers. We need to set a rate for businesses that's fair, close the loopholes and make our tax code simpler and more equitable for everyone."

Governor Paul LePage (R, ME): "From his long and successful career in business, President Trump knows firsthand that a burdensome tax code doesn't create jobs, it kills them. When he outlined his vision for tax reform last week, I was pleased to see it will help Maine families keep more of their hard-earned paychecks."

Governor Chris Sununu (R, NH): "America's business tax rates are probably the most self-destructive feature of the current system. By reducing the highest business tax rate in the developed world, something that we have shown, right here in New Hampshire, is a huge boost to competitiveness that creates new jobs and higher wages. And finally repealing the death tax is long overdue."

Governor Kim Reynolds (R, IA): "Iowa families are burdened with high income taxes that lower their take-home pay and business tax rates that limit economic opportunities and wage increases. Because up to 75 percent of the burden of business tax rates falls on workers, paychecks are smaller and raises are all too rare. When working families should be dedicating money to savings, college and retirement accounts, they're sending too much out of their hard-earned paychecks to Washington, D.C., instead."

Governor Rick Snyder (R, MI): "It has been more than 30 years since Washington, D.C. passed major tax reform. Since then, the tax code has become a 74,000-page Goliath puzzling American families and businesses. We need reform now to ensure Americans receive much-needed tax relief, provide a boost to our nation's economic growth and allow millions of workers to keep more of their hard-earned money."

Governor Phil Bryant (R, MS): "With a level playing field, American businesses and workers will once again dominate a global economy. I am grateful the president and the Republican congressional leadership are committed to making that happen. The framework deserves to become legislation and should pass Congress. This is a once-in-a-lifetime opportunity that we cannot afford to miss."

Governor Henry McMaster (R, SC): "For too long, our tax code has been overcomplicated and uncompetitive, placing an outsized burden on business while perplexing the average American. This is a rare opportunity to fix a broken system, putting money back in taxpayers' pockets and encouraging more companies to invest, expand, hire and profit. It's a win for South Carolina."

Governor Jim Justice (R, WV): "President Trump is continuing to keep his promise to Americans to help grow our country by providing our average families with significant tax relief."

Governor Matt Bevin (R, KY): "Recently, our national economy has been rebounding following a long period of tepid recovery. That makes this the perfect time to tackle federal tax reform and I applaud President Trump for his leadership on this issue."

Governor Asa Hutchinson (R, AR): "Washington's system of taxation takes too much money, is too complicated and hampers economic growth. The result is a system that places too heavy a burden on our businesses and citizens. It places our country at a disadvantage in an increasingly competitive and mobile world."

Governor Eric Greitens (R, MO): "For too long, our tax system has been complex, corrupt, and high. We need a system that is simple, fair, and low. In Missouri, we're trying to do our part at the state level—but the biggest changes that small business owners need begin at the federal level. The President understands this. We were pleased that he chose Springfield, Missouri, to announce his effort on tax reform. And we were glad to host him in St. Charles, Missouri, on Wednesday, where he again sent a message to Congress to get tax reform legislation done and delivered."

Governor Gary Herbert (R, UT): "If we want businesses to come to the United States and stay, we have to create the right conditions. I commend Congressional leaders for their efforts to lower the U.S. corporate tax rate and move to a system that will encourage companies to bring their profits to the United States and invest in the American economy. Our corporate rate—highest in the industrialized world—and our treatment of overseas earnings are glaring exceptions to an otherwise business friendly environment. Lower taxes and a simpler tax code means faster economic growth, more jobs, and higher wages. There are still important differences to be ironed out, but it's refreshing to see Washington tackling something difficult but necessary. Let's hope it's the beginning of a new trend."

Governor Matthew Mead (R, WY): "Eliminating onerous restrictions and regulations would allow businesses to afford to pay employees higher wages and reinvest in their own growth."

Governor Mary Fallin (R, OK): "Our nation's tax code, on the other hand, is outdated and in desperate need of reform. Due to incomprehensible regulations and untold pages of forms and instructions, nearly 90% of taxpayers need external help to simply pay their taxes."

Governor Susana Martinez (R, NM): "New Mexicans deserve a tax system that puts their household budget ahead of more government bureaucracy. Real tax reform on the federal and state levels is long overdue and it is now time we put our communities and businesses first."

Governor Greg Abbott (R, TX): "Listen, the fact of the matter is that it has been far too long since we've had tax reform in the United States of America. This is a meaningful step toward the kind of tax reform that the United States needs. I think it is important especially at the corporate level so that internationally we will be

more competitive. … We will be advancing the United States of America economically if this tax plan passes and so I hope it does."

Governor Rick Scott (R, FL): "My budget cuts $180 million in taxes to build on our success of cutting taxes 75 times saving Floridians more than $7.5 billion. DC needs to follow our lead and get tax reform done now."

Governor Pete Ricketts (R, NE): "I applaud the President and congressional leadership for making tax reform a top priority this year . . . . Providing relief will put more money back into the pockets of hardworking families and unleash economic growth in communities across our nation."

Governor Bill Walker (I, AK): The House and Senate conference committee on tax legislation has a singular opportunity to open one of the most prospective onshore areas in the world to safe oil and gas exploration and development – limited to 1/750th of the Coastal Plain or 1002 Area, which itself is just eight percent of ANWR – right here in the United States, on the North Slope of Alaska. It is critical that Congress act and get this legislation over the finish line to put the national resources of the Coastal Plain to use for the good of the country. Alaska's economy needs this boost, and our nation needs a strong Alaska.

Governor Doug Burgum (R, ND): "North Dakota leaders have worked hard over the past 25 years to reduce individual and corporate income tax rates, pass sensible regulations and foster a business-friendly environment that stimulates investment and job creation, and we appreciate President Trump recognizing those continuing efforts . . . . We share the president's goals for tax reform: simplify the tax code, lower rates to ease the burden on middle-class families and set corporate tax rates at levels that allow U.S. businesses to better compete in the global economy, bringing back jobs and wealth from overseas. And we urge Congress to work with the administration to achieve meaningful tax reform that encourages economic growth and saves taxpayers time and money."

Governor Dennis Daugaard (R, SD): "I thank @SenJohnThune, @SenatorRounds and @RepKristiNoem for their support of tax reform. They understand that responsible reform can jumpstart our economy."

Governor Scott Walker (R, WI): "Our nation's tax code, on the other hand, is outdated and in desperate need of reform. Due to the incomprehensible regulations and untold pages of forms and instructions, nearly 90 percent of taxpayers need external help to simply comply with paying their taxes. Across the country, this time and energy spent adds up to some 6 billion hours and $15-16 billion in tax compliance costs, according to the Internal Revenue Service and the National Federation of Independent Business."

Governor Kay Ivey (R, AL): "President Trump is proposing the largest tax cut for American families and businesses in decades . . . . The current tax structure is oppressive to families and businesses alike, and it simply sets us up for failure in today's global economy. We've proven in Alabama, with the lowest unemployment rate in history, lower taxes and less government regulation produces jobs – it's time Washington joins us in our efforts."

Governor Eric Holcomb (R, IL): "We must simplify, close loopholes, institute fairness and lower overall rates—especially for small business."

Governor Brian Sandoval (R, NV): "Reforming the nation's tax code is an incredibly complex task that is long overdue. I applaud the President for making this a priority in this Congress, and I appreciate Congress' attention as they reform our tax code with a focus on fairness, competitiveness and economic growth. I continue to appreciate the leadership of Senator Heller and our entire Congressional delegation; their willingness to work with the state will help ensure the final legislative product will be one that will help Nevada grow, put more Nevadans to work, and allow Nevadans to keep more of their hard-earned money."

LT. GOVERNORS

Lt. Governor Casey Cagle (R, GA): "To reach our nation's potential we need a tax system that empowers entrepreneurs and businesses to invest in our workforce. Our leaders have an opportunity to set us on a path of economic growth, job creation, and prosperity to enable more of our families to climb up the economic ladder. I applaud the leadership of President Trump and our state's congressional delegation for their support of the Tax Cuts and Jobs Act, delivering hardworking Georgians the tax relief they deserve. Americans have waited 31 years for meaningful tax reform, and the stakes have never been greater."

Lt. Governor Rebecca Kleefisch (R, WI): "I am grateful that President Donald Trump and House Speaker Paul Ryan are finally tackling reform of our broken federal tax code. They're working right now on an ambitious plan to make the federal tax code simpler, flatter and fairer."

Lt. Governor Mary Taylor (R, OH): "The President is proposing the biggest tax cut to small and midsize businesses in 80 years, and as we have seen in Ohio, this will jumpstart the nation's economy. The Council of Economic Advisors has estimated that the average American household income could increase between $4,000 and $9,000 a year in wages and salary alone from this proposal."

Lt. Governor Brian Calley (R, MI): "The reform plan President Trump unveiled last month will be a game changer for all Americans. We know its principles are sound because of our experience here in Michigan. A simple, fair and efficient tax code will go a long way for everyone."

Lt. Governor Mike Foley (R, NE): "President Trump is following through on his commitment to help grow America's middle class with federal tax reform."

Lt. Governor Mike Parson (R, MO): "The President of the United States is offering a tax plan that would greatly benefit Missouri families . . . . The President's plan would reduce taxes and allow families to keep more of their hard-earned money. It would also allow the next generation of Missouri workers to invest in themselves, afford a quality education, and get a good job here in our state."

Lt. Governor Tim Griffin (R, AR): "Individuals and families know how to spend the fruits of their labor and provide for their families better than bureaucrats a thousand miles away. Tax reform will allow Arkansans to save for the future, pay off credit-card debt, or simply make ends meet."

STATEWIDE OFFICALS

Bill Schuette, Attorney General (R, MI): "The last president to reform America's tax code was Ronald Reagan. During his time in office, America added 15.9 million jobs, an increase in the nation's workforce of more than 17 percent. Now more than ever, our economy needs a booster shot. President Trump's tax reform is just what the doctor ordered to simplify the code, create more jobs and spur greater growth in our economy."

Josh Hawley, Attorney General (R, MO): "President Trump has a bold plan to change course and give working Missourians a chance to move ahead. His plan honors real work and prioritizes the taxpayers instead of the tax takers."

John McMillan, State Agricultural Commissioner (R, AL): "Farmers in Alabama and across the nation face natural disasters, significant price fluctuations in the market, increased regulations and many other challenges. Without comprehensive tax reform, the American farmer may eventually be taxed out of business or at least taxed where he or she can no longer pass the farm on to the next generation. The elimination of the estate tax is just one of the revisions in the Tax Reform plan that provide farmers hope."

Jeff Witte, State Agricultural Director (NM): "The farm and ranch property often has to be split and sold to satisfy estate taxes upon the death of a family member. This predicament leads to the next generation having to take family assets to satisfy the tax in order to preserve the enterprise as a whole, leaving these individuals in a position in which they cannot succeed financially, eventually losing the family business."

Mike Strain, State Agricultural Commissioner (R, LA): "A lowering and restricting of tax rates will put more money in the pockets of our citizens and will ultimately allow farmers and other business owners to have more money to invest and help grow the economy. Lower tax rates for consumers will also increase their purchasing power for better nutrition for all American families."

Dave Yost, State Auditor (R, OH): "Tax reform would be good for the economy, and it will be good for Ohio families. The President's plan will double the standard deduction so that more income is taxed at zero percent. It will increase and expand the Child Tax Credit to help more middle-class families and -- finally! -- eliminate the marriage penalty."

Ron Knecht, Controller (R, NV): "The special interests that benefit from exemptions, deductions and credits available only to some parties are few in number, but each member of the group has a large stake in keeping these provisions."

John Dougall, State Auditor (R, UT): "As the Republican Congress and President Trump take up the daunting issue of tax reform, we encourage our federal colleagues to follow Utah's lead and create a system that is simple, equitable, and stable for American taxpayers."

Walker Stapleton, State Treasurer (R, CO): "I applaud and support the efforts of federal lawmakers and President Trump to simplify our nation's tax code and jump-start our economy. As Treasurer, I know Colorado families and small businesses will benefit from a tax plan that is simpler and our economy will thrive with a lower corporate rate. It will bring jobs and investment back to America and make us more competitive in a global economy . . . . This is a once in a generation opportunity to fundamentally change the structure of our complicated and burdensome tax code. I support the efforts of Congress and the President to get it done."

SPEAKERS OF THE HOUSE

House Speaker Mike Turzai (R, PA): "It's the number one policy initiative . . . and nothing will help families and employees and jobs more."

House Speaker Richard Corcoran (R, FL): "Nationally, it's clear that we need broad tax reform, and I'll gladly support any effort to simplify the tax code and cut rates. Luckily for the nation, the conservative spirit that drove Florida's success is alive and well in the tax framework that Trump laid out."

House Speaker Brian Bosma (R, IN): "With one of the top business climates in the nation, Indiana's economic environment stands in stark contrast to the dysfunction of federal tax policy and job-killing regulations."

House Speaker Tim Moore (R, NC): "Tax relief is about protecting hard-earned paychecks and empowering all families in the workforce to succeed together in the entrepreneurial spirit of the United States. It's about helping everyday people provide themselves a higher quality of life and build opportunities without an excessive burden on their bottom line. Again, for Congress and President Trump to realize the full potential of the American economy, North Carolina is the bellwether state when it comes to tax reform."

House Speaker Tim Armstead (R, WV): "President Trump's plan would provide significant tax relief to the backbone of West Virginia's economy – our small businesses. Perhaps no segment of West Virginia's economy has had to weather the economic storm more than our small and family-owned businesses. The President recognizes the challenges our small businesses must meet and has proposed to cap the maximum tax rate these

businesses must pay. This step will provide a much-needed boost to these struggling small businesses who mean so much to our neighborhoods across West Virginia."

December 7, 2017

The Honorable Mitch McConnell
Majority Leader
U.S. Senate
Washington, D.C. 20510

The Honorable Paul D. Ryan
Speaker
U.S. House of Representative
Washington, D.C. 20515

Dear Leader McConnell and Speaker Ryan,

"The purpose of cutting taxes now is not to incur a budget deficit, but to achieve the more prosperous, expanding economy which can bring a budget surplus."

President John F. Kennedy's comments promoting comprehensive tax reform before the Economic Club of New York more than a half-century ago are just as valid today. America needs a tax cut.

Since January 2011, Republican governors have enacted $62 billion worth of tax cuts for the hard-working people of our states, according to Americans for Tax Reform. Many of these same governors inherited massive budget deficits. Today, many of those same states have budget surpluses, significant job growth and employment levels, and historic funding for priorities like education. Our reforms have been undeniably positive for the hard-working taxpayers we serve and for the bottom line of our states.

Our nation's tax code, on the other hand, is outdated and in desperate need of reform. Due to incomprehensible regulations and untold pages of forms and instructions, nearly 90% of taxpayers need external help to simply pay their taxes. Across the country, the time and energy spent adds up to some 6 billion hours and $15 billion to $16 billion in tax compliance costs, according to the Internal Revenue Service and the National Federation of Independent Business.

The negative impact on business is just as burdensome. America's corporate tax rate of 39%, the highest in the world among industrialized countries with advanced economies, drives job creators away from our shores. Since businesses have less money to work with after taxes, it suppresses wages and reinvestment for those that stay.

We need a tax plan that will allow entrepreneurs and small businesses more room to improve, invest and expand, propelling economic growth and creating more family-supporting careers, all while freeing up

Americans to keep more of their hard-earned money. We need to simplify the tax code and reduce the burden on hard-working people all across the United States.

Such streamlining changes, if enacted, would pay huge dividends in driving economic growth and reinvigorating our workforce. With a corporate tax rate comparable to other advanced economies, businesses would be encouraged to do business in America, bringing potentially billions in income and millions of jobs along with them. Eliminating onerous restrictions and regulations would allow businesses to afford to pay employees higher wages and reinvest in their own growth. Meanwhile, middle-class families would earn more, keep more due to a higher standard deduction, save more with less stress, and pass on more to their children without fear of a weighty death tax.

We urge the two chambers to pass meaningful tax reform legislation and send it to the President's desk. We've proven in our states that you can cut taxes, create jobs, and generate budget surpluses all at the same time. If it can work in our states, it can work for America.

Sincerely,

Governor Scott Walker Wisconsin	Governor Kay Ivey Alabama	Governor Douglas A. Ducey Arizona
Governor Asa Hutchinson Arkansas	Governor Eric Holcomb Indiana	Governor Kim Reynolds Iowa
Governor Matt Bevin Kentucky	Governor Paul R. LePage Maine	Governor Phil Bryant Mississippi
Governor Eric R. Greitens Missouri	Governor Pete Ricketts Nebraska	Governor Christopher T. Sununu New Hampshire
Governor Susana Martinez New Mexico	Governor Doug Burgum North Dakota	Governor Mary Fallin Oklahoma

Governor Henry McMaster
South Carolina

Governor Dennis Daugaard
South Dakota

Governor Bill Haslam
Tennessee

Governor Greg Abbott
Texas

Governor Gary R. Herbert
Utah

Governor Matthew H. Mead
Wyoming

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Unsubscribe

The White House · 1600 Pennsylvania Avenue, NW · Washington DC 20500 · 202-456-1111

Message

From: Block, Molly [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=60D0C681A16441A0B4FA16AA2DD4B9C5-BLOCK, MOLL]
Sent: 2/26/2018 1:49:54 PM
To: Lynn, Tricia [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d8747ba49cde485ea4ac58dbf09c3dcd-TRICIA SLUSSER]; Press [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b293283291dc44e0b5d1c36be9281d8a-Press]
Subject: RE: FOR REVIEW: ProPublica Follow-Up (Molly Parker). RE: HUD - EPA MOU. (2/23)

ok

From: Lynn, Tricia
Sent: Monday, February 26, 2018 8:48 AM
To: Press <Press@epa.gov>
Subject: FW: FOR REVIEW: ProPublica Follow-Up (Molly Parker). RE: HUD - EPA MOU. (2/23)

Reporter is pinging. OK to send?

From: Lynn, Tricia
Sent: Friday, February 23, 2018 3:45 PM
To: Press <Press@epa.gov>
Subject: FOR REVIEW: ProPublica Follow-Up (Molly Parker). RE: HUD - EPA MOU. (2/23)

Reporter is back asking more questions about the MOU between EPA and HUD regarding low income housing near Superfund sites. Note that the inquiry is lengthy, but that's mostly the reporter's language. (Our responses are in bold.) Reporter is Molly Parker (Ex. 6 - Personal Privacy) with ProPublica.

Q: According to HUD, EPA has provided HUD with briefing documents for all of the 10 sites identified which include a site description, ATSDR health consultation, EPA human exposure status, EPA regional perspective, proposed and implemented remedies, and maps of the site and proximity to HUD-assisted housing.

* Per HUD's directions, I am reaching back out to the EPA for specific questions regarding these sites. Please provide all documents that pertain to the 10 identified priority sites, which are listed below, plus the three sites identified as "needing more work:"

Priority list

> Omaha Lead (Omaha, NE)
> Brown's Dump and Jacksonville Ash (Jacksonville, FL)
> Oronogo-Duenweg Mining Belt (Joplin, MO)
> Jacobsville Neighborhood Soil Contamination (Evansville, IN)
> Anniston PCB Site (Anniston, AL)
> Southwest Jefferson County Mining District (Jefferson County, MO)
> Welsbach & General Gas Mantle [Camden radiation] (Camden, NJ)
> Tar Creek (Ottawa County, OK)
> Raymark Industries (Stratford, CT)
> Colorado Smelter (Pueblo, CO)
> PLUS 3 needing more work: Pilsen Neighborhood Contamination (Chicago, IL), American Lead (Indianapolis, IN), Former Chattanooga Foundries (Chattanooga, TN)

Ex. 5 - Deliberative Process

Q: While I appreciate the links you shared on background, I had already reviewed that information. My questions, however, were not answered. Specifically, can you provide an update on what activities HUD and the EPA have conducted in the past year related to residents living in HUD-assisted housing on these above identified sites or others where human exposure to lead in the soil is not fully controlled. What is your timeline for activities moving forward?

Ex. 5 - Deliberative Process

Q: According to HUD, "HUD is still waiting on the sampling results for the Beck's Lake site and will plan to share the results with the property owners and residents." Has EPA already shared these results with HUD? If not, what is the timeline for doing so?

Ex. 5 - Deliberative Process

Q: According to HUD, "EPA is not actively sampling at other HUD-assisted properties at this time." Does EPA plan to do so in the near future? If not, does this represent a change in policy (please explain). If the EPA does intend to begin actively sampling at other HUD-assisted properties, please outline the agency's timeline for doing so.

Ex. 5 - Deliberative Process

Q: According to the memo that prompted these questions, the priority sites were chosen based on the number of HUD-assisted housing units located near Superfund sites where lead in the soil is the primary contaminant and public health concern. Can you confirm whether that is correct?

Ex. 5 - Deliberative Process

Q: It appears that there are numerous other sites with fewer HUD-assisted housing units but where the environmental cleanup phases are not as far along. Does EPA-HUD intend to review all sites where lead in the soil may pose a risk to residents living in assisted housing, regardless of the number of people living there?

Ex. 5 - Deliberative Process

Q: If EPA does intend to undertake this effort, please outline your timeline for doing so. If not, does that represent a policy shift from the MOU? (Either way, please explain).

Ex. 5 - Deliberative Process

Below are the other sites included on the memo, though as I understand it, this list is not exhaustive either:

> Anaconda Co. Smelter (Montana)

> Hill Air Force Base (Utah)

>Newton County Mine Tailings (Missouri)

>Lower Darby Creek Area (Pennsylvania)

>Big River Mine Tailings/St. Joe Minerals Corp (Missouri)

>Alcoa Properties (Illinois)

>Sulphur Bank Mercury Mine (California)

>Washington County Lead District -- Furnace Creek (Missouri)

>Cherokee County (Kansas)

Madison County Mines (Missouri)

-----Original Message-----
From: Molly Parker [mailto: Ex. 6 - Personal Privacy
Sent: Wednesday, February 14, 2018 11:26 AM
To: Jones, Enesta <Jones.Enesta@epa.gov>
Cc: Lynn, Tricia <lynn.tricia@epa.gov>
Subject: Re: HUD-EPA Collaboration

Thank you for your response. I have a couple of follow up questions:

According to HUD, EPA has provided HUD with briefing documents for all of the 10 sites identified which include a site description, ATSDR health consultation, EPA human exposure status, EPA regional perspective, proposed and implemented remedies, and maps of the site and proximity to HUD-assisted housing.

* Per HUD's directions, I am reaching back out to the EPA for specific questions regarding these sites. Please provide all documents that pertain to the 10 identified priority sites, which are listed below, plus the three sites identified as "needing more work:"

Priority list

> Omaha Lead (Omaha, NE)
> Brown's Dump and Jacksonville Ash (Jacksonville, FL)
> Oronogo-Duenweg Mining Belt (Joplin, MO)
> Jacobsville Neighborhood Soil Contamination (Evansville, IN)
> Anniston PCB Site (Anniston, AL)
> Southwest Jefferson County Mining District (Jefferson County, MO)
> Welsbach & General Gas Mantle [Camden radiation] (Camden, NJ)
> Tar Creek (Ottawa County, OK)
> Raymark Industries (Stratford, CT)
> Colorado Smelter (Pueblo, CO)

> PLUS 3 needing more work: Pilsen Neighborhood Contamination (Chicago, IL), American Lead (Indianapolis, IN), Former Chattanooga Foundries (Chattanooga, TN)

* While I appreciate the links you shared on background, I had already reviewed that information. My questions, however, were not answered. Specifically, can you provide an update on what activities HUD and the EPA have conducted in the past year related to residents living in HUD-assisted housing on these above identified sites or others where human exposure to lead in the soil is not fully controlled. What is your timeline for activities moving forward?

* According to HUD, "HUD is still waiting on the sampling results for the Beck's Lake site and will plan to share the results with the property owners and residents." Has EPA already shared these results with HUD? If not, what is the timeline for doing so?

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* According to the memo that prompted these questions, the priority sites were chosen based on the number of HUD-assisted housing units located near Superfund sites where lead in the soil is the primary contaminant and public health concern. Can you confirm whether that is correct? It appears that there are numerous other sites with fewer HUD-assisted housing units but where the environmental cleanup phases are not as far along. Does EPA-HUD intend to review all sites where lead in the soil may pose a risk to residents living in assisted housing, regardless of the number of people living there? If EPA does intend to undertake this effort, please outline your timeline for doing so. If not, does that represent a policy shift from the MOU? (Either way, please explain). Below are the other sites included on the memo, though as I understand it, this list is not exhaustive either:

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>Sulphur Bank Mercury Mine (California)

>Washington County Lead District -- Furnace Creek (Missouri)

>Cherokee County (Kansas)

Madison County Mines (Missouri)

Thank you for your consideration of my questions.

Molly

From: Jones, Enesta <Jones.Enesta@epa.gov>
Sent: Tuesday, February 13, 2018 12:09 PM
To: Molly Parker
Cc: Press; Bassler, Rachel
Subject: HUD-EPA Collaboration

Molly,

Please contact HUD with questions about their properties.

On background: On Jan. 11, 2017, EPA and HUD signed a Memorandum of Understanding titled "Improving Communication About Certain Public and HUD-Assisted Multifamily Housing Near Superfund Sites." Under the MOU, "HUD and the Environmental Protection Agency (EPA) are working together to improve communication when either identifies a nexus between HUD Properties and NPL sites which EPA has identified as of potential health concern for housing residents."

A copy of the MOU is available at https://www.hudexchange.info/resources/documents/Memorandum-of-Understanding-between-HUD-and-EPA-Regarding-Improving-Communication-About-Certain-Public-and-HUD-Assisted-Multifamily-Housing-Near-Superfund-Sites.pdf<https://urldefense.proofpoint.com/v2/url?u=https-3A__www.hudexchange.info_resources_documents_Memorandum-2Dof-2DUnderstanding-2Dbetween-2DHUD-2Dand-2DEPA-2DRegarding-2DImproving-2DCommunication-2DAbout-2DCertain-2DPublic-2Dand-2DHUD-2DAssisted-2DMultifamily-2DHousing-2DNear-2DSuperfund-2DSites.pdf&d=DwMGaQ&c=UCja3IwhyjPGYeHcG7oIbg&r=GIXIxm6qbGWrhmqPrx57hAkQnW2OLzulT53pGqgYhKw&m=1pQuydt35tA7xpkmZGQ1un3mpmmdDPcxGGl3Nj5iDIw&s=_DP4ZNZ6OJ_31GRz4IoZzqPUwMcRR4fLaGg5LrvZiMk&e=>.

You can find information on EPA's work at Superfund sites at https://www.epa.gov/superfund/search-superfund-sites-where-you-live<https://urldefense.proofpoint.com/v2/url?u=https-3A__www.epa.gov_superfund_search-2Dsuperfund-2Dsites-2Dwhere-2Dyou-2Dlive&d=DwMGaQ&c=UCja3IwhyjPGYeHcG7oIbg&r=GIXIxm6qbGWrhmqPrx57hAkQnW2OLzulT53pGqgYhKw&m=1pQuydt35tA7xpkmZGQ1un3mpmmdDPcxGGl3Nj5iDIw&s=OqZ0aKpotcaNqGH4jITXc_BbW88B9b2pZ3EcOwK8fsg&e=>.

My primary questions are: Where does the evaluation of these sites identified in this draft list stand? Has EPA started these evaluations, and have any of them concluded? Have the property owners or housing authorities been notified of the results? Have residents been notified? (I may have follow up questions, but for starters, I'm trying to understand where things are in the process concerning this list).

Molly

Molly Parker

Reporter,

The Southern Illinoisan/

Lee Enterprises &

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Ex. 6 - Personal Privacy

Message

From:	Lynn, Tricia [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=D8747BA49CDE485EA4AC58DBF09C3DCD-TRICIA SLUSSER]
Sent:	2/26/2018 1:47:50 PM
To:	Press [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b293283291dc44e0b5d1c36be9281d8a-Press]
Subject:	FW: FOR REVIEW: ProPublica Follow-Up (Molly Parker). RE: HUD - EPA MOU. (2/23)

Reporter is pinging. OK to send?

From: Lynn, Tricia
Sent: Friday, February 23, 2018 3:45 PM
To: Press <Press@epa.gov>
Subject: FOR REVIEW: ProPublica Follow-Up (Molly Parker). RE: HUD - EPA MOU. (2/23)

Reporter is back asking more questions about the MOU between EPA and HUD regarding low income housing near Superfund sites. Note that the inquiry is lengthy, but that's mostly the reporter's language. (Our responses are in bold.) Reporter is Molly Parker (Ex. 6 - Personal Privacy) with ProPublica.

Q: According to HUD, EPA has provided HUD with briefing documents for all of the 10 sites identified which include a site description, ATSDR health consultation, EPA human exposure status, EPA regional perspective, proposed and implemented remedies, and maps of the site and proximity to HUD-assisted housing.

* Per HUD's directions, I am reaching back out to the EPA for specific questions regarding these sites. Please provide all documents that pertain to the 10 identified priority sites, which are listed below, plus the three sites identified as "needing more work:"

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Ex. 5 - Deliberative Process

Q: While I appreciate the links you shared on background, I had already reviewed that information. My questions, however, were not answered. Specifically, can you provide an update on what activities HUD and the EPA have conducted in the past year related to residents living in HUD-assisted housing on these above identified sites or others where human exposure to lead in the soil is not fully controlled. What is your timeline for activities moving forward?

Ex. 5 - Deliberative Process

Q: According to HUD, "HUD is still waiting on the sampling results for the Beck's Lake site and will plan to share the results with the property owners and residents." Has EPA already shared these results with HUD? If not, what is the timeline for doing so?

Ex. 5 - Deliberative Process

Q: According to HUD, "EPA is not actively sampling at other HUD-assisted properties at this time." Does EPA plan to do so in the near future? If not, does this represent a change in policy (please explain). If the EPA does intend to begin actively sampling at other HUD-assisted properties, please outline the agency's timeline for doing so.

Ex. 5 - Deliberative Process

Q: According to the memo that prompted these questions, the priority sites were chosen based on the number of HUD-assisted housing units located near Superfund sites where lead in the soil is the primary contaminant and public health concern. Can you confirm whether that is correct?

Ex. 5 - Deliberative Process

Q: It appears that there are numerous other sites with fewer HUD-assisted housing units but where the environmental cleanup phases are not as far along. Does EPA-HUD intend to review all sites where lead in the soil may pose a risk to residents living in assisted housing, regardless of the number of people living there?

Ex. 5 - Deliberative Process

Q: If EPA does intend to undertake this effort, please outline your timeline for doing so. If not, does that represent a policy shift from the MOU? (Either way, please explain).

Ex. 5 - Deliberative Process

Below are the other sites included on the memo, though as I understand it, this list is not exhaustive either:

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>Alcoa Properties (Illinois)

>Sulphur Bank Mercury Mine (California)

>Washington County Lead District -- Furnace Creek (Missouri)

>Cherokee County (Kansas)

Madison County Mines (Missouri)

-----Original Message-----
From: Molly Parker [mailto: Ex. 6 - Personal Privacy
Sent: Wednesday, February 14, 2018 11:26 AM
To: Jones, Enesta <Jones.Enesta@epa.gov>
Cc: Lynn, Tricia <lynn.tricia@epa.gov>
Subject: Re: HUD-EPA Collaboration

Thank you for your response. I have a couple of follow up questions:

According to HUD, EPA has provided HUD with briefing documents for all of the 10 sites identified which include a site description, ATSDR health consultation, EPA human exposure status, EPA regional perspective, proposed and implemented remedies, and maps of the site and proximity to HUD-assisted housing.

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Thank you for your consideration of my questions.

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Cc: Press; Bassler, Rachel
Subject: HUD-EPA Collaboration

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You can find information on EPA’s work at Superfund sites at https://www.epa.gov/superfund/search-superfund-sites-where-you-live<https://urldefense.proofpoint.com/v2/url?u=https-3A__www.epa.gov_superfund_search-2Dsuperfund-2Dsites-2Dwhere-2Dyou-2Dlive&d=DwMGaQ&c=UCja3IwhyjPGYeHcG7oIbg&r=GIXIxm6qbGWrhmqPrx57hAkQnW2OLzulT53pGqgYhKw&m=1pQuydt35tA7xpkmZGQ1un3mpmmdDPcxGGl3Nj5iDIw&s=OqZ0aKpotcaNqGH4jITXc_BbW88B9b2pZ3EcOwK8fsg&e=>.

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Molly Parker

Reporter,

The Southern Illinoisan/

Lee Enterprises &

ProPublica Local Reporting Network

Ex. 6 - Personal Privacy

Message

From: Jones, Enesta [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=65B8E6C6E5CA4A7A9AE85D98A4C8EEDB-EJONES02]
Sent: 3/2/2018 2:48:42 PM
To: Ex. 6 - Personal Privacy
CC: Press [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b293283291dc44e0b5d1c36be9281d8a-Press]
Subject: Re: HUD-EPA Collaboration

Molly,

There are existing datasets on our public website:
You can search https://www.epa.gov/superfund/superfund-data-and-reports for the following information:
- List 8R – Active Sites
- List 8R – Archive Sites

In addition, we also recommend searching for individual sites here: https://www.epa.gov/superfund/search-superfund-sites-where-you-live#npl. Once you find a site, click on the link to bring up that site's profile page. Data and reports from SEMS can be found in the following places:

- Cleanup Activities > Operable Units
- Cleanup Activities > Cleanup Progress
- Health & Environment
- Site Documents & Data

-----Original Message-----
From: Molly Parker [mailto: Ex. 6 - Personal Privacy]
Sent: Monday, February 26, 2018 10:10 AM
To: Lynn, Tricia <lynn.tricia@epa.gov>
Subject: Re: HUD-EPA Collaboration

Hi Tricia, The main thing I'm trying to verify: the SEMS database that's referenced below from which EPA is providing stats to HUD. How much of that is available to the public online and what portions do I need to FOIA? My hard deadline is today or ASAP considering I may need to prepare FOIAs to EPA and/or HUD and the responses take awhile.

> On Feb 26, 2018, at 8:55 AM, Lynn, Tricia <lynn.tricia@epa.gov> wrote:
>
> Hi Molly--
>
> I'm not a subject matter expert, so a call with me wouldn't do you much good. ;)
>
> I'm happy to check into the possibility of a call, though please be aware that they're not always available. In either case, I'd need a list of your specific questions and your hard deadline in order to proceed. Please forward those to me at your earliest convenience.
>
> Best,
>
> Tricia
>
> -----Original Message-----
> From: Molly Parker [mailto: Ex. 6 - Personal Privacy
> Sent: Monday, February 26, 2018 9:22 AM

> To: Lynn, Tricia <lynn.tricia@epa.gov>
> Subject: Re: HUD-EPA Collaboration
>
> Thank you. Do you have a moment for a phone conversation later this morning, on background?
>
> Sent from my iPhone
>
> On Feb 26, 2018, at 8:13 AM, Lynn, Tricia <lynn.tricia@epa.gov<mailto:lynn.tricia@epa.gov>> wrote:
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> Molly—
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> Again, on background. See our responses in bold:
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> Q: According to HUD, EPA has provided HUD with briefing documents for all of the 10 sites identified which include a site description, ATSDR health consultation, EPA human exposure status, EPA regional perspective, proposed and implemented remedies, and maps of the site and proximity to HUD-assisted housing.
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> * Per HUD's directions, I am reaching back out to the EPA for specific questions regarding these sites. Please provide all documents that pertain to the 10 identified priority sites, which are listed below, plus the three sites identified as "needing more work:"
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> A: Please contact the regional offices for this information.
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> Q: While I appreciate the links you shared on background, I had already reviewed that information. My questions, however, were not answered. Specifically, can you provide an update on what activities HUD and the EPA have conducted in the past year related to residents living in HUD-assisted housing on these above identified sites or others where human exposure to lead in the soil is not fully controlled. What is your timeline for activities moving forward?
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> A: Please contact the regional offices for this information.
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> Q: According to HUD, "HUD is still waiting on the sampling results for the Beck's Lake site and will plan to share the results with the property owners and residents." Has EPA already shared these results with HUD? If not, what is the timeline for doing so?
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> A: Please contact Region 5.
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> Q: According to HUD, "EPA is not actively sampling at other HUD-assisted properties at this time." Does EPA plan to do so in the near future? If not, does this represent a change in policy (please explain). If the EPA does intend to begin actively sampling at other HUD-assisted properties, please outline the agency's timeline for doing so.
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> A: EPA's understanding is that HUD prioritized these properties based on its criteria. Please contact HUD
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> Q: It appears that there are numerous other sites with fewer HUD-assisted housing units but where the environmental cleanup phases are not as far along. Does EPA-HUD intend to review all sites where lead in the soil may pose a risk to residents living in assisted housing, regardless of the number of people living there?
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> A: Per section V.(E.) of the MOU, "EPA intends to provide data to HUD, on an annual basis, on NPL sites including geospatial data describing site boundaries, when available, or coordinates representing the site centers, and data from the Superfund Enterprise Management System (SEMS) database, describing contaminants, remedy status, and current environmental indicators for sites." Please contact HUD regarding their plans for these data.
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>
> EPA will address these sites in the same manner as other Superfund sites. Information on the Superfund cleanup process is available at https://urldefense.proofpoint.com/v2/url?u=https-3A__www.epa.gov_superfund_superfund-2Dcleanup-2Dprocess&d=DwIGaQ&c=UCja3IwhyjPGYeHcG7oIbg&r=GIXIxm6qbGWrhmqPrx57hAkQnW2OLzulT53pGqgYhKw&m=RUZOqXb9er_x_W6hL7dTTbSnGIGTFnnjiUxR8gb10ZA&s=7A_VQmEX5j4m7LM0ALES4JXchoNw-ygYND8YbG2bOUk&e=<https://urldefense.proofpoint.com/v2/url?u=https-3A__www.epa.gov_superfund_superfund-2Dcleanup-2Dprocess&d=DwMFAg&c=UCja3IwhyjPGYeHcG7oIbg&r=GIXIxm6qbGWrhmqPrx57hAkQnW2OLzulT53pGqgYhKw&m=IiwIlclhOnTulgY4xEsHaC1LBV7PcBOPgjSigZY_OVA&s=CjuvL6bOfeefDeEgCsNQr3bFOBGYVaVir2uCVJVm31g&e=>.
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> Should EPA's work with HUD bring to light any new concerns, EPA will assess that information and adjust priorities as appropriate.
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> Q: If EPA does intend to undertake this effort, please outline your timeline for doing so. If not, does that represent a policy shift from the MOU? (Either way, please explain).
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> A: This does not represent a policy shift from the MOU.
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> Tricia
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> -----Original Message-----
> From: Molly Parker [mailto: Ex. 6 - Personal Privacy
> Sent: Wednesday, February 14, 2018 11:26 AM
> To: Jones, Enesta <Jones.Enesta@epa.gov<mailto:Jones.Enesta@epa.gov>>
> Cc: Lynn, Tricia <lynn.tricia@epa.gov<mailto:lynn.tricia@epa.gov>>
> Subject: Re: HUD-EPA Collaboration
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> * While I appreciate the links you shared on background, I had already reviewed that information. My questions, however, were not answered. Specifically, can you provide an update on what activities HUD and the EPA have conducted in the past year related to residents living in HUD-assisted housing on these above identified sites or others where human exposure to lead in the soil is not fully controlled. What is your timeline for activities moving forward?
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> * According to HUD, "EPA is not actively sampling at other HUD-assisted properties at this time." Does EPA plan to do so in the near future? If not, does this represent a change in policy (please explain). If the EPA does intend to begin actively sampling at other HUD-assisted properties, please outline the agency's timeline for doing so.
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> Molly
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> From: Jones, Enesta <Jones.Enesta@epa.gov<mailto:Jones.Enesta@epa.gov>>
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> Sent: Tuesday, February 13, 2018 12:09 PM
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> To: Molly Parker
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> Cc: Press; Bassler, Rachel
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> Subject: HUD-EPA Collaboration
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> Molly,
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> Please contact HUD with questions about their properties.
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> A copy of the MOU is available at https://urldefense.proofpoint.com/v2/url?u=https-3A__www.hudexchange.info_resources_documents_Memorandum-2Dof-2DUnderstanding-2Dbetween-2DHUD-2Dand-2DEPA-2DRegarding-2DImproving-2DCommunication-2DAbout-2DCertain-2DPublic-2Dand-2DHUD-2DAssisted-2DMultifamily-2DHousing-2DNear-2DSuperfund-2DSites.pdf&d=DwIGaQ&c=UCja3IwhyjPGYeHcG7oIbg&r=GIXIxm6qbGWrhmqPrx57hAkQnW2OLzulT53pGqgYhKw&m=RUZOqXb9er_x_W6hL7dTTbSnGIGTFnnjiUxR8gb10ZA&s=N5ueViGgdj_KQOc7JTT37TIz0b3OTxEgxOYvqeucD14&e=<https://urldefense.proofpoint.com/v2/url?u=https-3A__www.hudexchange.info_resources_documents_Memorandum-2Dof-2DUnderstanding-2Dbetween-2DHUD-2Dand-2DEPA-2DRegarding-2DImproving-2DCommunication-2DAbout-2DCertain-2DPublic-2Dand-2DHUD-2DAssisted-2DMultifamily-2DHousing-2DNear-2DSuperfund-2DSites.pdf&d=DwMGaQ&c=UCja3IwhyjPGYeHcG7oIbg&r=GIXIxm6qbGWrhmqPrx57hAkQnW2OLzulT53pGqgYhKw&m=1pQuydt35tA7xpkmZGQ1un3mpmmdDPcxGGl3Nj5iDIw&s=_DP4ZNZ6OJ_31GRz4IoZzqPUwMcRR4fLaGg5LrvZiMk&e<https://www.hudexchange.info/resources/documents/Memorandum-of-Understanding-between-HUD-and-EPA-Regarding-Improving-Communication-About-Certain-Public-and-HUD-Assisted-Multifamily-Housing-Near-Superfund-

Sites.pdf%3chttps:/urldefense.proofpoint.com/v2/url?u=https-
3A__www.hudexchange.info_resources_documents_Memorandum-2Dof-2DUnderstanding-2Dbetween-2DHUD-2Dand-
2DEPA-2DRegarding-2DImproving-2DCommunication-2DAbout-2DCertain-2DPublic-2Dand-2DHUD-2DAssisted-
2DMultifamily-2DHousing-2DNear-2DSuperfund-
2DSites.pdf&d=DwMGaQ&c=UCja3IwhyjPGYeHcG7oIbg&r=GIXIxm6qbGWrhmqPrx57hAkQnW2OLzulT53pGqgYhKw&m=
1pQuydt35tA7xpkmZGQ1un3mpmmdDPcxGGl3Nj5iDIw&s=_DP4ZNZ6OJ_31GRz4IoZzqPUwMcRR4fLaGg5LrvZiMk&e>=>.
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> You can find information on EPA’s work at Superfund sites at https://urldefense.proofpoint.com/v2/url?u=https-
3A__www.epa.gov_superfund_search-2Dsuperfund-2Dsites-2Dwhere-2Dyou-
2Dlive&d=DwIGaQ&c=UCja3IwhyjPGYeHcG7oIbg&r=GIXIxm6qbGWrhmqPrx57hAkQnW2OLzulT53pGqgYhKw&m=RUZOq
Xb9er_x_W6hL7dTTbSnGIGTFnnjiUxR8gb10ZA&s=cBTHNgLLvagFnvCUXCM-
IluiutWJ3OMeoNQbXidYFDg&e=<https://urldefense.proofpoint.com/v2/url?u=https-
3A__www.epa.gov_superfund_search-2Dsuperfund-2Dsites-2Dwhere-2Dyou-
2Dlive&d=DwMGaQ&c=UCja3IwhyjPGYeHcG7oIbg&r=GIXIxm6qbGWrhmqPrx57hAkQnW2OLzulT53pGqgYhKw&m=1pQu
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2Dyou-2Dlive-253chttps-3A_urldefense.proofpoint.com_v2_url-3Fu-3Dhttps-2D3A-5F-5Fwww.epa.gov-5Fsuperfund-
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3D1pQuydt35tA7xpkmZGQ1un3mpmmdDPcxGGl3Nj5iDIw-26s-3DOqZ0aKpotcaNqGH4jITXc-
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26e&d=DwMFAg&c=UCja3IwhyjPGYeHcG7oIbg&r=GIXIxm6qbGWrhmqPrx57hAkQnW2OLzulT53pGqgYhKw&m=IiwllclhO
nTulgY4xEsHaC1LBV7PcBOPgjSigZY_OVA&s=ljHutkZibqUO0yOfMsa1mDZ_yj-BXYBAgJxlRJt0cRg&e=>=>.
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> My primary questions are: Where does the evaluation of these sites identified in this draft list stand? Has EPA started these evaluations, and have any of them concluded? Have the property owners or housing authorities been notified of the results? Have residents been notified? (I may have follow up questions, but for starters, I’m trying to understand where things are in the process concerning this list).
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> Molly Parker
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> Reporter,
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> The Southern Illinoisan/
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> ProPublica Local Reporting Network
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Message

From: Block, Molly [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=60D0C681A16441A0B4FA16AA2DD4B9C5-BLOCK, MOLL]
Sent: 3/2/2018 2:46:39 PM
To: Jones, Enesta [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=65b8e6c6e5ca4a7a9ae85d98a4c8eedb-EJones02]; Press [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b293283291dc44e0b5d1c36be9281d8a-Press]
Subject: RE: FOR REVIEW: ProPublica Additional Follow-Up (Molly Parker). RE: HUD - EPA MOU. (3/1)

Updated below

From: Jones, Enesta
Sent: Friday, March 2, 2018 9:44 AM
To: Press <Press@epa.gov>
Subject: FW: FOR REVIEW: ProPublica Additional Follow-Up (Molly Parker). RE: HUD - EPA MOU. (3/1)

Ok to send?

From: Lynn, Tricia
Sent: Thursday, March 01, 2018 2:36 PM
To: Press <Press@epa.gov>
Subject: FOR REVIEW: ProPublica Additional Follow-Up (Molly Parker). RE: HUD - EPA MOU. (3/1)

Background:

Reporter has returned, asking about the availability of data connected to low income housing in Superfund areas. Molly Parker Ex. 6 - Personal Privacy with ProPublica.

Suggested Response:

Q. The SEMS database that's referenced below from which EPA is providing stats to HUD. How much of that is available to the public online and what portions do I need to FOIA? My hard deadline is today or ASAP considering I may need to prepare FOIAs to EPA and/or HUD and the responses take awhile.

Ex. 5 - Deliberative Process

-----Original Message-----
From: Molly Parker Ex. 6 - Personal Privacy

Sent: Monday, February 26, 2018 10:10 AM
To: Lynn, Tricia <lynn.tricia@epa.gov>
Subject: Re: HUD-EPA Collaboration

Hi Tricia, The main thing I'm trying to verify: the SEMS database that's referenced below from which EPA is providing stats to HUD. How much of that is available to the public online and what portions do I need to FOIA? My hard deadline is today or ASAP considering I may need to prepare FOIAs to EPA and/or HUD and the responses take awhile.

> On Feb 26, 2018, at 8:55 AM, Lynn, Tricia <lynn.tricia@epa.gov> wrote:
>
> Hi Molly--
>
> I'm not a subject matter expert, so a call with me wouldn't do you much good. ;)
>
> I'm happy to check into the possibility of a call, though please be aware that they're not always available. In either case, I'd need a list of your specific questions and your hard deadline in order to proceed. Please forward those to me at your earliest convenience.
>
> Best,
>
> Tricia
>
> -----Original Message-----
> From: Molly Parker [mailto: Ex. 6 - Personal Privacy
> Sent: Monday, February 26, 2018 9:22 AM
> To: Lynn, Tricia <lynn.tricia@epa.gov>
> Subject: Re: HUD-EPA Collaboration
>
> Thank you. Do you have a moment for a phone conversation later this morning, on background?
>
> Sent from my iPhone
>
> On Feb 26, 2018, at 8:13 AM, Lynn, Tricia <lynn.tricia@epa.gov<mailto:lynn.tricia@epa.gov>> wrote:
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> Molly—
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> Again, on background. See our responses in bold:
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> Q: According to HUD, EPA has provided HUD with briefing documents for all of the 10 sites identified which include a site description, ATSDR health consultation, EPA human exposure status, EPA regional perspective, proposed and implemented remedies, and maps of the site and proximity to HUD-assisted housing.
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> * Per HUD's directions, I am reaching back out to the EPA for specific questions regarding these sites. Please provide all documents that pertain to the 10 identified priority sites, which are listed below, plus the three sites identified as "needing more work:"
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> Priority list
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>> Omaha Lead (Omaha, NE)
>
>> Brown's Dump and Jacksonville Ash (Jacksonville, FL)
>
>> Oronogo-Duenweg Mining Belt (Joplin, MO)
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>> Jacobsville Neighborhood Soil Contamination (Evansville, IN)
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>> Anniston PCB Site (Anniston, AL)
>
>> Southwest Jefferson County Mining District (Jefferson County, MO)
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>> Welsbach & General Gas Mantle [Camden radiation] (Camden, NJ)
>
>> Tar Creek (Ottawa County, OK)
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>> Raymark Industries (Stratford, CT)
>
>> Colorado Smelter (Pueblo, CO)
>
>> PLUS 3 needing more work: Pilsen Neighborhood Contamination (Chicago, IL), American Lead (Indianapolis, IN), Former Chattanooga Foundries (Chattanooga, TN)
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> A: Please contact the regional offices for this information.
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> Q: While I appreciate the links you shared on background, I had already reviewed that information. My questions, however, were not answered. Specifically, can you provide an update on what activities HUD and the EPA have conducted in the past year related to residents living in HUD-assisted housing on these above identified sites or others where human exposure to lead in the soil is not fully controlled. What is your timeline for activities moving forward?
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> A: Please contact the regional offices for this information.
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> Q: According to HUD, "HUD is still waiting on the sampling results for the Beck's Lake site and will plan to share the results with the property owners and residents." Has EPA already shared these results with HUD? If not, what is the timeline for doing so?

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> A: Please contact Region 5.
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>
> Q: According to HUD, "EPA is not actively sampling at other HUD-assisted properties at this time." Does EPA plan to do so in the near future? If not, does this represent a change in policy (please explain). If the EPA does intend to begin actively sampling at other HUD-assisted properties, please outline the agency's timeline for doing so.
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> A: Please contact the regional offices for this information.
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> Q: According to the memo that prompted these questions, the priority sites were chosen based on the number of HUD-assisted housing units located near Superfund sites where lead in the soil is the primary contaminant and public health concern. Can you confirm whether that is correct?
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> A: EPA's understanding is that HUD prioritized these properties based on its criteria. Please contact HUD
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>
> Q: It appears that there are numerous other sites with fewer HUD-assisted housing units but where the environmental cleanup phases are not as far along. Does EPA-HUD intend to review all sites where lead in the soil may pose a risk to residents living in assisted housing, regardless of the number of people living there?
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> A: Per section V.(E.) of the MOU, "EPA intends to provide data to HUD, on an annual basis, on NPL sites including geospatial data describing site boundaries, when available, or coordinates representing the site centers, and data from the Superfund Enterprise Management System (SEMS) database, describing contaminants, remedy status, and current environmental indicators for sites." Please contact HUD regarding their plans for these data.
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> EPA will address these sites in the same manner as other Superfund sites. Information on the Superfund cleanup process is available at https://urldefense.proofpoint.com/v2/url?u=https-3A__www.epa.gov_superfund_superfund-2Dcleanup-2Dprocess&d=DwIGaQ&c=UCja3IwhyjPGYeHcG7oIbg&r=GIXIxm6qbGWrhmqPrx57hAkQnW2OLzulT53pGqgYhKw&m=RUZOqXb9er_x_W6hL7dTTbSnGIGTFnnjiUxR8gb10ZA&s=7A_VQmEX5j4m7LM0ALES4JXchoNw-ygYND8YbG2bOUk&e=<https://urldefense.proofpoint.com/v2/url?u=https-3A__www.epa.gov_superfund_superfund-2Dcleanup-2Dprocess&d=DwMFAg&c=UCja3IwhyjPGYeHcG7oIbg&r=GIXIxm6qbGWrhmqPrx57hAkQnW2OLzulT53pGqgYhKw&m=IiwllclhOnTulgY4xEsHaC1LBV7PcBOPgjSigZY_OVA&s=CjuvL6bOfeefDeEgCsNQr3bFOBGYVaVir2uCVJVm31g&e=>.
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> Should EPA's work with HUD bring to light any new concerns, EPA will assess that information and adjust priorities as appropriate.
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> Q: If EPA does intend to undertake this effort, please outline your timeline for doing so. If not, does that represent a policy shift from the MOU? (Either way, please explain).
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> A: This does not represent a policy shift from the MOU.
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> Below are the other sites included on the memo, though as I understand it, this list is not exhaustive either:
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>> Cherokee County (Kansas)
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> Madison County Mines (Missouri)
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> Best,
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>
> Tricia
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> -----Original Message-----
> From: Molly Parker [mailto: Ex. 6 - Personal Privacy
> Sent: Wednesday, February 14, 2018 11:26 AM
> To: Jones, Enesta <Jones.Enesta@epa.gov<mailto:Jones.Enesta@epa.gov>>
> Cc: Lynn, Tricia <lynn.tricia@epa.gov<mailto:lynn.tricia@epa.gov>>
> Subject: Re: HUD-EPA Collaboration
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> Thank you for your response. I have a couple of follow up questions:
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>> Welsbach & General Gas Mantle [Camden radiation] (Camden, NJ)
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>> Tar Creek (Ottawa County, OK)
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>> PLUS 3 needing more work: Pilsen Neighborhood Contamination (Chicago, IL), American Lead (Indianapolis, IN), Former Chattanooga Foundries (Chattanooga, TN)
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> Molly
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> ________________________________
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> From: Jones, Enesta <Jones.Enesta@epa.gov<mailto:Jones.Enesta@epa.gov>>
>
> Sent: Tuesday, February 13, 2018 12:09 PM
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> To: Molly Parker
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> Cc: Press; Bassler, Rachel
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> Subject: HUD-EPA Collaboration
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> Molly,
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> Please contact HUD with questions about their properties.
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> A copy of the MOU is available at https://urldefense.proofpoint.com/v2/url?u=https-3A__www.hudexchange.info_resources_documents_Memorandum-2Dof-2DUnderstanding-2Dbetween-2DHUD-2Dand-2DEPA-2DRegarding-2DImproving-2DCommunication-2DAbout-2DCertain-2DPublic-2Dand-2DHUD-2DAssisted-2DMultifamily-2DHousing-2DNear-2DSuperfund-2DSites.pdf&d=DwIGaQ&c=UCja3IwhyjPGYeHcG7oIbg&r=GIXIxm6qbGWrhmqPrx57hAkQnW2OLzulT53pGqgYhKw&m=RUZOqXb9er_x_W6hL7dTTbSnGIGTFnnjiUxR8gb10ZA&s=N5ueViGgdj_KQOc7JTT37TIz0b3OTxEgxOYvqeucD14&e=<https://urldefense.proofpoint.com/v2/url?u=https-3A__www.hudexchange.info_resources_documents_Memorandum-2Dof-2DUnderstanding-2Dbetween-2DHUD-2Dand-2DEPA-2DRegarding-2DImproving-2DCommunication-2DAbout-2DCertain-2DPublic-2Dand-2DHUD-2DAssisted-2DMultifamily-2DHousing-2DNear-2DSuperfund-2DSites.pdf&d=DwMGaQ&c=UCja3IwhyjPGYeHcG7oIbg&r=GIXIxm6qbGWrhmqPrx57hAkQnW2OLzulT53pGqgYhKw&m=1pQuydt35tA7xpkmZGQ1un3mpmmdDPcxGGl3Nj5iDIw&s=_DP4ZNZ6OJ_31GRz4IoZzqPUwMcRR4fLaGg5LrvZiMk&e<https://www.hudexchange.info/resources/documents/Memorandum-of-Understanding-between-HUD-and-EPA-Regarding-Improving-Communication-About-Certain-Public-and-HUD-Assisted-Multifamily-Housing-Near-Superfund-Sites.pdf%3chttps:/urldefense.proofpoint.com/v2/url?u=https-3A__www.hudexchange.info_resources_documents_Memorandum-2Dof-2DUnderstanding-2Dbetween-2DHUD-2Dand-2DEPA-2DRegarding-2DImproving-2DCommunication-2DAbout-2DCertain-2DPublic-2Dand-2DHUD-2DAssisted-2DMultifamily-2DHousing-2DNear-2DSuperfund-2DSites.pdf&d=DwMGaQ&c=UCja3IwhyjPGYeHcG7oIbg&r=GIXIxm6qbGWrhmqPrx57hAkQnW2OLzulT53pGqgYhKw&m=1pQuydt35tA7xpkmZGQ1un3mpmmdDPcxGGl3Nj5iDIw&s=_DP4ZNZ6OJ_31GRz4IoZzqPUwMcRR4fLaGg5LrvZiMk&e>=>.
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> You can find information on EPA’s work at Superfund sites at https://urldefense.proofpoint.com/v2/url?u=https-3A__www.epa.gov_superfund_search-2Dsuperfund-2Dsites-2Dwhere-2Dyou-2Dlive&d=DwIGaQ&c=UCja3IwhyjPGYeHcG7oIbg&r=GIXIxm6qbGWrhmqPrx57hAkQnW2OLzulT53pGqgYhKw&m=RUZOqXb9er_x_W6hL7dTTbSnGIGTFnnjiUxR8gb10ZA&s=cBTHNgLLvagFnvCUXCM-IluiutWJ3OMeoNQbXidYFDg&e=<https://urldefense.proofpoint.com/v2/url?u=https-3A__www.epa.gov_superfund_search-2Dsuperfund-2Dsites-2Dwhere-2Dyou-2Dlive&d=DwMGaQ&c=UCja3IwhyjPGYeHcG7oIbg&r=GIXIxm6qbGWrhmqPrx57hAkQnW2OLzulT53pGqgYhKw&m=1pQuydt35tA7xpkmZGQ1un3mpmmdDPcxGGl3Nj5iDIw&s=OqZ0aKpotcaNqGH4jITXc_BbW88B9b2pZ3EcOwK8fsg&e<https://urldefense.proofpoint.com/v2/url?u=https-3A__www.epa.gov_superfund_search-2Dsuperfund-2Dsites-2Dwhere-2Dyou-2Dlive-253chttps-3A_urldefense.proofpoint.com_v2_url-3Fu-3Dhttps-2D3A-5F-5Fwww.epa.gov-5Fsuperfund-

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3DUCja3IwhyjPGYeHcG7oIbg-26r-3DGIXIxm6qbGWrhmqPrx57hAkQnW2OLzulT53pGqgYhKw-26m-
3D1pQuydt35tA7xpkmZGQ1un3mpmmdDPcxGGl3Nj5iDIw-26s-3DOqZ0aKpotcaNqGH4jITXc-
5FBbW88B9b2pZ3EcOwK8fsg-
26e&d=DwMFAg&c=UCja3IwhyjPGYeHcG7oIbg&r=GIXIxm6qbGWrhmqPrx57hAkQnW2OLzulT53pGqgYhKw&m=IiwllclhOnTulgY4xEsHaC1LBV7PcBOPgjSigZY_OVA&s=ljHutkZibqUO0yOfMsa1mDZ_yj-BXYBAgJxlRJt0cRg&e=>=>.
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> My primary questions are: Where does the evaluation of these sites identified in this draft list stand? Has EPA started these evaluations, and have any of them concluded? Have the property owners or housing authorities been notified of the results? Have residents been notified? (I may have follow up questions, but for starters, I'm trying to understand where things are in the process concerning this list).
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> Molly
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> Molly Parker
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> Reporter,
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> The Southern Illinoisan/
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> ProPublica Local Reporting Network

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Message

From:	Jones, Enesta [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=65B8E6C6E5CA4A7A9AE85D98A4C8EEDB-EJONES02]
Sent:	3/2/2018 2:43:58 PM
To:	Press [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b293283291dc44e0b5d1c36be9281d8a-Press]
Subject:	FW: FOR REVIEW: ProPublica Additional Follow-Up (Molly Parker). RE: HUD - EPA MOU. (3/1)

Ok to send?

From: Lynn, Tricia
Sent: Thursday, March 01, 2018 2:36 PM
To: Press <Press@epa.gov>
Subject: FOR REVIEW: ProPublica Additional Follow-Up (Molly Parker). RE: HUD - EPA MOU. (3/1)

Background:

Reporter has returned, asking about the availability of data connected to low income housing in Superfund areas. Molly Parker (Molly.Parker@thesouthern.com) with ProPublica.

Suggested Response:

Ex. 5 - Deliberative Process

On our public website there are existing datasets which likely include all of the publically releasable information:

You can search https://www.epa.gov/superfund/superfund-data-and-reports for the following information:
- List 8R – Active Sites
- List 8R – Archive Sites

In addition, we also recommend searching for individual sites here: https://www.epa.gov/superfund/search-superfund-sites-where-you-live#npl. Once you find a site, click on the link to bring up that site's profile page. Data and reports from SEMS can be found in the following places:

- Cleanup Activities > Operable Units
- Cleanup Activities > Cleanup Progress
- Health & Environment
- Site Documents & Data

If you search through this information and don't find what you need, please reconnect with us with a specific data request and we can tell you whether that information is publicly available or if you'll need to submit a FOIA request.

-----Original Message-----
From: Molly Parker [mailto: Ex. 6 - Personal Privacy]
Sent: Monday, February 26, 2018 10:10 AM
To: Lynn, Tricia <lynn.tricia@epa.gov>
Subject: Re: HUD-EPA Collaboration

Hi Tricia, The main thing I'm trying to verify: the SEMS database that's referenced below from which EPA is providing stats to HUD. How much of that is available to the public online and what portions do I need to FOIA? My hard deadline is today or ASAP considering I may need to prepare FOIAs to EPA and/or HUD and the responses take awhile.

> On Feb 26, 2018, at 8:55 AM, Lynn, Tricia <lynn.tricia@epa.gov> wrote:
>
> Hi Molly--
>
> I'm not a subject matter expert, so a call with me wouldn't do you much good. ;)
>
> I'm happy to check into the possibility of a call, though please be aware that they're not always available. In either case, I'd need a list of your specific questions and your hard deadline in order to proceed. Please forward those to me at your earliest convenience.
>
> Best,
>
> Tricia
>
> -----Original Message-----
> From: Molly Parker [mailto: Ex. 6 - Personal Privacy]
> Sent: Monday, February 26, 2018 9:22 AM
> To: Lynn, Tricia <lynn.tricia@epa.gov>
> Subject: Re: HUD-EPA Collaboration
>
> Thank you. Do you have a moment for a phone conversation later this morning, on background?
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> Sent from my iPhone
>
> On Feb 26, 2018, at 8:13 AM, Lynn, Tricia <lynn.tricia@epa.gov<mailto:lynn.tricia@epa.gov>> wrote:
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> Molly—
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> Again, on background. See our responses in bold:
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> Q: According to HUD, EPA has provided HUD with briefing documents for all of the 10 sites identified which include a site description, ATSDR health consultation, EPA human exposure status, EPA regional perspective, proposed and implemented remedies, and maps of the site and proximity to HUD-assisted housing.
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> * Per HUD's directions, I am reaching back out to the EPA for specific questions regarding these sites. Please provide all documents that pertain to the 10 identified priority sites, which are listed below, plus the three sites identified as "needing more work:"
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> Priority list
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>
>> Omaha Lead (Omaha, NE)
>
>> Brown's Dump and Jacksonville Ash (Jacksonville, FL)
>
>> Oronogo-Duenweg Mining Belt (Joplin, MO)
>
>> Jacobsville Neighborhood Soil Contamination (Evansville, IN)
>
>> Anniston PCB Site (Anniston, AL)
>
>> Southwest Jefferson County Mining District (Jefferson County, MO)
>
>> Welsbach & General Gas Mantle [Camden radiation] (Camden, NJ)
>
>> Tar Creek (Ottawa County, OK)
>
>> Raymark Industries (Stratford, CT)
>
>> Colorado Smelter (Pueblo, CO)
>
>> PLUS 3 needing more work: Pilsen Neighborhood Contamination (Chicago, IL), American Lead (Indianapolis, IN), Former Chattanooga Foundries (Chattanooga, TN)
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> A: Please contact the regional offices for this information.
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> Q: While I appreciate the links you shared on background, I had already reviewed that information. My questions, however, were not answered. Specifically, can you provide an update on what activities HUD and the EPA have conducted in the past year related to residents living in HUD-assisted housing on these above identified sites or others where human exposure to lead in the soil is not fully controlled. What is your timeline for activities moving forward?
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> A: Please contact the regional offices for this information.
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> Q: According to HUD, "HUD is still waiting on the sampling results for the Beck's Lake site and will plan to share the results with the property owners and residents." Has EPA already shared these results with HUD? If not, what is the timeline for doing so?
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> A: Please contact Region 5.
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> Q: According to HUD, “EPA is not actively sampling at other HUD-assisted properties at this time.” Does EPA plan to do so in the near future? If not, does this represent a change in policy (please explain). If the EPA does intend to begin actively sampling at other HUD-assisted properties, please outline the agency’s timeline for doing so.
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> A: Please contact the regional offices for this information.
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> Q: According to the memo that prompted these questions, the priority sites were chosen based on the number of HUD-assisted housing units located near Superfund sites where lead in the soil is the primary contaminant and public health concern. Can you confirm whether that is correct?
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> A: EPA’s understanding is that HUD prioritized these properties based on its criteria. Please contact HUD
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> Q: It appears that there are numerous other sites with fewer HUD-assisted housing units but where the environmental cleanup phases are not as far along. Does EPA-HUD intend to review all sites where lead in the soil may pose a risk to residents living in assisted housing, regardless of the number of people living there?
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> A: Per section V.(E.) of the MOU, “EPA intends to provide data to HUD, on an annual basis, on NPL sites including geospatial data describing site boundaries, when available, or coordinates representing the site centers, and data from the Superfund Enterprise Management System (SEMS) database, describing contaminants, remedy status, and current environmental indicators for sites.” Please contact HUD regarding their plans for these data.
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> EPA will address these sites in the same manner as other Superfund sites. Information on the Superfund cleanup process is available at https://urldefense.proofpoint.com/v2/url?u=https-3A__www.epa.gov_superfund_superfund-2Dcleanup-2Dprocess&d=DwIGaQ&c=UCja3IwhyjPGYeHcG7oIbg&r=GIXIxm6qbGWrhmqPrx57hAkQnW2OLzulT53pGqgYhKw&m=RUZOqXb9er_x_W6hL7dTTbSnGIGTFnnjiUxR8gb10ZA&s=7A_VQmEX5j4m7LM0ALES4JXchoNw-ygYND8YbG2bOUk&e=<https://urldefense.proofpoint.com/v2/url?u=https-3A__www.epa.gov_superfund_superfund-2Dcleanup-2Dprocess&d=DwMFAg&c=UCja3IwhyjPGYeHcG7oIbg&r=GIXIxm6qbGWrhmqPrx57hAkQnW2OLzulT53pGqgYhKw&m=IiwllclhOnTulgY4xEsHaC1LBV7PcBOPgjSigZY_OVA&s=CjuvL6bOfeefDeEgCsNQr3bFOBGYVaVir2uCVJVm31g&e=>.
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> Should EPA’s work with HUD bring to light any new concerns, EPA will assess that information and adjust priorities as appropriate.
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> Q: If EPA does intend to undertake this effort, please outline your timeline for doing so. If not, does that represent a policy shift from the MOU? (Either way, please explain).

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> A: This does not represent a policy shift from the MOU.
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> Below are the other sites included on the memo, though as I understand it, this list is not exhaustive either:
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>> Anaconda Co. Smelter (Montana)
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>> Hill Air Force Base (Utah)
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>> Newton County Mine Tailings (Missouri)
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>
>> Lower Darby Creek Area (Pennsylvania)
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>> Big River Mine Tailings/St. Joe Minerals Corp (Missouri)
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>> Alcoa Properties (Illinois)
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>> Sulphur Bank Mercury Mine (California)
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>> Washington County Lead District -- Furnace Creek (Missouri)
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>> Cherokee County (Kansas)
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> Madison County Mines (Missouri)
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> Best,
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> Tricia
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> -----Original Message-----
> From: Molly Parker [mailto: Ex. 6 - Personal Privacy]
> Sent: Wednesday, February 14, 2018 11:26 AM
> To: Jones, Enesta <Jones.Enesta@epa.gov<mailto:Jones.Enesta@epa.gov>>
> Cc: Lynn, Tricia <lynn.tricia@epa.gov<mailto:lynn.tricia@epa.gov>>
> Subject: Re: HUD-EPA Collaboration
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> Thank you for your response. I have a couple of follow up questions:
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> According to HUD, EPA has provided HUD with briefing documents for all of the 10 sites identified which include a site description, ATSDR health consultation, EPA human exposure status, EPA regional perspective, proposed and implemented remedies, and maps of the site and proximity to HUD-assisted housing.
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> * Per HUD's directions, I am reaching back out to the EPA for specific questions regarding these sites. Please provide all documents that pertain to the 10 identified priority sites, which are listed below, plus the three sites identified as "needing more work:"
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>> Jacobsville Neighborhood Soil Contamination (Evansville, IN)
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>> Welsbach & General Gas Mantle [Camden radiation] (Camden, NJ)
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>> Tar Creek (Ottawa County, OK)
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>> Raymark Industries (Stratford, CT)
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>> Colorado Smelter (Pueblo, CO)
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>> PLUS 3 needing more work: Pilsen Neighborhood Contamination (Chicago, IL), American Lead (Indianapolis, IN), Former Chattanooga Foundries (Chattanooga, TN)
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> * While I appreciate the links you shared on background, I had already reviewed that information. My questions, however, were not answered. Specifically, can you provide an update on what activities HUD and the EPA have conducted in the past year related to residents living in HUD-assisted housing on these above identified sites or others where human exposure to lead in the soil is not fully controlled. What is your timeline for activities moving forward?
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> * According to HUD, "HUD is still waiting on the sampling results for the Beck's Lake site and will plan to share the results with the property owners and residents." Has EPA already shared these results with HUD? If not, what is the timeline for doing so?
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> * According to HUD, "EPA is not actively sampling at other HUD-assisted properties at this time." Does EPA plan to do so in the near future? If not, does this represent a change in policy (please explain). If the EPA does intend to begin actively sampling at other HUD-assisted properties, please outline the agency's timeline for doing so.
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> * According to the memo that prompted these questions, the priority sites were chosen based on the number of HUD-assisted housing units located near Superfund sites where lead in the soil is the primary contaminant and public health concern. Can you confirm whether that is correct? It appears that there are numerous other sites with fewer HUD-assisted housing units but where the environmental cleanup phases are not as far along. Does EPA-HUD intend to review all sites where lead in the soil may pose a risk to residents living in assisted housing, regardless of the number of people living there? If EPA does intend to undertake this effort, please outline your timeline for doing so. If not, does that represent a policy shift from the MOU? (Either way, please explain). Below are the other sites included on the memo, though as I understand it, this list is not exhaustive either:
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>> Newton County Mine Tailings (Missouri)
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>> Alcoa Properties (Illinois)
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>> Sulphur Bank Mercury Mine (California)
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>> Washington County Lead District -- Furnace Creek (Missouri)
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>> Cherokee County (Kansas)
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> Madison County Mines (Missouri)

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> Thank you for your consideration of my questions.
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> Molly
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> ______________________________
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> From: Jones, Enesta <Jones.Enesta@epa.gov<mailto:Jones.Enesta@epa.gov>>
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> Sent: Tuesday, February 13, 2018 12:09 PM
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> To: Molly Parker
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> Cc: Press; Bassler, Rachel
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> Subject: HUD-EPA Collaboration
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> Molly,
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> Please contact HUD with questions about their properties.
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> On background: On Jan. 11, 2017, EPA and HUD signed a Memorandum of Understanding titled "Improving Communication About Certain Public and HUD-Assisted Multifamily Housing Near Superfund Sites." Under the MOU, "HUD and the Environmental Protection Agency (EPA) are working together to improve communication when either

identifies a nexus between HUD Properties and NPL sites which EPA has identified as of potential health concern for housing residents."
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> A copy of the MOU is available at https://urldefense.proofpoint.com/v2/url?u=https-
3A__www.hudexchange.info_resources_documents_Memorandum-2Dof-2DUnderstanding-2Dbetween-2DHUD-2Dand-
2DEPA-2DRegarding-2DImproving-2DCommunication-2DAbout-2DCertain-2DPublic-2Dand-2DHUD-2DAssisted-
2DMultifamily-2DHousing-2DNear-2DSuperfund-
2DSites.pdf&d=DwIGaQ&c=UCja3IwhyjPGYeHcG7oIbg&r=GIXIxm6qbGWrhmqPrx57hAkQnW2OLzulT53pGqgYhKw&m=R
UZOqXb9er_x_W6hL7dTTbSnGIGTFnnjiUxR8gb10ZA&s=N5ueViGgdj_KQOc7JTT37TIz0b3OTxEgxOYvqeucD14&e=<https:/
/urldefense.proofpoint.com/v2/url?u=https-3A__www.hudexchange.info_resources_documents_Memorandum-2Dof-
2DUnderstanding-2Dbetween-2DHUD-2Dand-2DEPA-2DRegarding-2DImproving-2DCommunication-2DAbout-2DCertain-
2DPublic-2Dand-2DHUD-2DAssisted-2DMultifamily-2DHousing-2DNear-2DSuperfund-
2DSites.pdf&d=DwMGaQ&c=UCja3IwhyjPGYeHcG7oIbg&r=GIXIxm6qbGWrhmqPrx57hAkQnW2OLzulT53pGqgYhKw&m=
1pQuydt35tA7xpkmZGQ1un3mpmmdDPcxGGl3Nj5iDIw&s=_DP4ZNZ6OJ_31GRz4IoZzqPUwMcRR4fLaGg5LrvZiMk&e<htt
ps://www.hudexchange.info/resources/documents/Memorandum-of-Understanding-between-HUD-and-EPA-
Regarding-Improving-Communication-About-Certain-Public-and-HUD-Assisted-Multifamily-Housing-Near-Superfund-
Sites.pdf%3chttps:/urldefense.proofpoint.com/v2/url?u=https-
3A__www.hudexchange.info_resources_documents_Memorandum-2Dof-2DUnderstanding-2Dbetween-2DHUD-2Dand-
2DEPA-2DRegarding-2DImproving-2DCommunication-2DAbout-2DCertain-2DPublic-2Dand-2DHUD-2DAssisted-
2DMultifamily-2DHousing-2DNear-2DSuperfund-
2DSites.pdf&d=DwMGaQ&c=UCja3IwhyjPGYeHcG7oIbg&r=GIXIxm6qbGWrhmqPrx57hAkQnW2OLzulT53pGqgYhKw&m=
1pQuydt35tA7xpkmZGQ1un3mpmmdDPcxGGl3Nj5iDIw&s=_DP4ZNZ6OJ_31GRz4IoZzqPUwMcRR4fLaGg5LrvZiMk&e>=>.
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> You can find information on EPA's work at Superfund sites at https://urldefense.proofpoint.com/v2/url?u=https-
3A__www.epa.gov_superfund_search-2Dsuperfund-2Dsites-2Dwhere-2Dyou-
2Dlive&d=DwIGaQ&c=UCja3IwhyjPGYeHcG7oIbg&r=GIXIxm6qbGWrhmqPrx57hAkQnW2OLzulT53pGqgYhKw&m=RUZOq
Xb9er_x_W6hL7dTTbSnGIGTFnnjiUxR8gb10ZA&s=cBTHNgLLvagFnvCUXCM-
IluiutWJ3OMeoNQbXidYFDg&e=<https://urldefense.proofpoint.com/v2/url?u=https-
3A__www.epa.gov_superfund_search-2Dsuperfund-2Dsites-2Dwhere-2Dyou-
2Dlive&d=DwMGaQ&c=UCja3IwhyjPGYeHcG7oIbg&r=GIXIxm6qbGWrhmqPrx57hAkQnW2OLzulT53pGqgYhKw&m=1pQu
ydt35tA7xpkmZGQ1un3mpmmdDPcxGGl3Nj5iDIw&s=OqZ0aKpotcaNqGH4jITXc_BbW88B9b2pZ3EcOwK8fsg&e<https://
urldefense.proofpoint.com/v2/url?u=https-3A__www.epa.gov_superfund_search-2Dsuperfund-2Dsites-2Dwhere-
2Dyou-2Dlive-253chttps-3A_urldefense.proofpoint.com_v2_url-3Fu-3Dhttps-2D3A-5F-5Fwww.epa.gov-5Fsuperfund-
5Fsearch-2D2Dsuperfund-2D2Dsites-2D2Dwhere-2D2Dyou-2D2Dlive-26d-3DDwMGaQ-26c-
3DUCja3IwhyjPGYeHcG7oIbg-26r-3DGIXIxm6qbGWrhmqPrx57hAkQnW2OLzulT53pGqgYhKw-26m-
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26e&d=DwMFAg&c=UCja3IwhyjPGYeHcG7oIbg&r=GIXIxm6qbGWrhmqPrx57hAkQnW2OLzulT53pGqgYhKw&m=IiwllclhO
nTulgY4xEsHaC1LBV7PcBOPgjSigZY_OVA&s=ljHutkZibqUO0yOfMsa1mDZ_yj-BXYBAgJxlRJt0cRg&e=>=>.
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> My primary questions are: Where does the evaluation of these sites identified in this draft list stand? Has EPA started these evaluations, and have any of them concluded? Have the property owners or housing authorities been notified of the results? Have residents been notified? (I may have follow up questions, but for starters, I'm trying to understand where things are in the process concerning this list).
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Message

From: Lynn, Tricia [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=D8747BA49CDE485EA4AC58DBF09C3DCD-TRICIA SLUSSER]
Sent: 2/23/2018 8:43:34 PM
To: Press [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b293283291dc44e0b5d1c36be9281d8a-Press]
Subject: FOR REVIEW: ProPublica Follow-Up (Molly Parker). RE: HUD - EPA MOU. (2/23)

Reporter is back asking more questions about the MOU between EPA and HUD regarding low income housing near Superfund sites. Note that the inquiry is lengthy, but that's mostly the reporter's language. (Our responses are in bold.) Reporter is Molly Parker (Ex. 6 - Personal Privacy) with ProPublica.

Q: According to HUD, EPA has provided HUD with briefing documents for all of the 10 sites identified which include a site description, ATSDR health consultation, EPA human exposure status, EPA regional perspective, proposed and implemented remedies, and maps of the site and proximity to HUD-assisted housing.

* Per HUD's directions, I am reaching back out to the EPA for specific questions regarding these sites. Please provide all documents that pertain to the 10 identified priority sites, which are listed below, plus the three sites identified as "needing more work:"

Priority list

> Omaha Lead (Omaha, NE)
> Brown's Dump and Jacksonville Ash (Jacksonville, FL)
> Oronogo-Duenweg Mining Belt (Joplin, MO)
> Jacobsville Neighborhood Soil Contamination (Evansville, IN)
> Anniston PCB Site (Anniston, AL)
> Southwest Jefferson County Mining District (Jefferson County, MO)
> Welsbach & General Gas Mantle [Camden radiation] (Camden, NJ)
> Tar Creek (Ottawa County, OK)
> Raymark Industries (Stratford, CT)
> Colorado Smelter (Pueblo, CO)
> PLUS 3 needing more work: Pilsen Neighborhood Contamination (Chicago, IL), American Lead (Indianapolis, IN), Former Chattanooga Foundries (Chattanooga, TN)

Ex. 5 - Deliberative Process

Q: While I appreciate the links you shared on background, I had already reviewed that information. My questions, however, were not answered. Specifically, can you provide an update on what activities HUD and the EPA have conducted in the past year related to residents living in HUD-assisted housing on these above identified sites or others where human exposure to lead in the soil is not fully controlled. What is your timeline for activities moving forward?

Ex. 5 - Deliberative Process

Q: According to HUD, "HUD is still waiting on the sampling results for the Beck's Lake site and will plan to share the results with the property owners and residents." Has EPA already shared these results with HUD? If not, what is the timeline for doing so?

Ex. 5 - Deliberative Process

Q: According to HUD, "EPA is not actively sampling at other HUD-assisted properties at this time." Does EPA plan to do so in the near future? If not, does this represent a change in policy (please explain). If the EPA does intend to begin actively sampling at other HUD-assisted properties, please outline the agency's timeline for doing so.

Ex. 5 - Deliberative Process

Q: According to the memo that prompted these questions, the priority sites were chosen based on the number of HUD-assisted housing units located near Superfund sites where lead in the soil is the primary contaminant and public health concern. Can you confirm whether that is correct?

Ex. 5 - Deliberative Process

Q: It appears that there are numerous other sites with fewer HUD-assisted housing units but where the environmental cleanup phases are not as far along. Does EPA-HUD intend to review all sites where lead in the soil may pose a risk to residents living in assisted housing, regardless of the number of people living there?

Ex. 5 - Deliberative Process

Q: If EPA does intend to undertake this effort, please outline your timeline for doing so. If not, does that represent a policy shift from the MOU? (Either way, please explain).

Ex. 5 - Deliberative Process

Below are the other sites included on the memo, though as I understand it, this list is not exhaustive either:

> Anaconda Co. Smelter (Montana)

> Hill Air Force Base (Utah)

>Newton County Mine Tailings (Missouri)

>Lower Darby Creek Area (Pennsylvania)

>Big River Mine Tailings/St. Joe Minerals Corp (Missouri)

>Alcoa Properties (Illinois)

>Sulphur Bank Mercury Mine (California)

>Washington County Lead District -- Furnace Creek (Missouri)

>Cherokee County (Kansas)

Madison County Mines (Missouri)

-----Original Message-----
From: Molly Parker [mailto: Ex. 6 - Personal Privacy
Sent: Wednesday, February 14, 2018 11:26 AM
To: Jones, Enesta <Jones.Enesta@epa.gov>
Cc: Lynn, Tricia <lynn.tricia@epa.gov>
Subject: Re: HUD-EPA Collaboration

Thank you for your response. I have a couple of follow up questions:

According to HUD, EPA has provided HUD with briefing documents for all of the 10 sites identified which include a site description, ATSDR health consultation, EPA human exposure status, EPA regional perspective, proposed and implemented remedies, and maps of the site and proximity to HUD-assisted housing.

* Per HUD's directions, I am reaching back out to the EPA for specific questions regarding these sites. Please provide all documents that pertain to the 10 identified priority sites, which are listed below, plus the three sites identified as "needing more work:"

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> Anniston PCB Site (Anniston, AL)
> Southwest Jefferson County Mining District (Jefferson County, MO)
> Welsbach & General Gas Mantle [Camden radiation] (Camden, NJ)
> Tar Creek (Ottawa County, OK)
> Raymark Industries (Stratford, CT)
> Colorado Smelter (Pueblo, CO)
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* While I appreciate the links you shared on background, I had already reviewed that information. My questions, however, were not answered. Specifically, can you provide an update on what activities HUD and the EPA have conducted in the past year related to residents living in HUD-assisted housing on these above identified sites or others where human exposure to lead in the soil is not fully controlled. What is your timeline for activities moving forward?

* According to HUD, "HUD is still waiting on the sampling results for the Beck's Lake site and will plan to share the results with the property owners and residents." Has EPA already shared these results with HUD? If not, what is the timeline for doing so?

* According to HUD, "EPA is not actively sampling at other HUD-assisted properties at this time." Does EPA plan to do so in the near future? If not, does this represent a change in policy (please explain). If the EPA does intend to begin actively sampling at other HUD-assisted properties, please outline the agency's timeline for doing so.

* According to the memo that prompted these questions, the priority sites were chosen based on the number of HUD-assisted housing units located near Superfund sites where lead in the soil is the primary contaminant and public health concern. Can you confirm whether that is correct? It appears that there are numerous other sites with fewer HUD-assisted housing units but where the environmental cleanup phases are not as far along. Does EPA-HUD intend to review all sites where lead in the soil may pose a risk to residents living in assisted housing, regardless of the number of people living there? If EPA does intend to undertake this effort, please outline your timeline for doing so. If not, does that represent a policy shift from the MOU? (Either way, please explain). Below are the other sites included on the memo, though as I understand it, this list is not exhaustive either:

> Anaconda Co. Smelter (Montana)

> Hill Air Force Base (Utah)

>Newton County Mine Tailings (Missouri)

>Lower Darby Creek Area (Pennsylvania)

>Big River Mine Tailings/St. Joe Minerals Corp (Missouri)

>Alcoa Properties (Illinois)

>Sulphur Bank Mercury Mine (California)

>Washington County Lead District -- Furnace Creek (Missouri)

>Cherokee County (Kansas)

Madison County Mines (Missouri)

Thank you for your consideration of my questions.

Molly

From: Jones, Enesta <Jones.Enesta@epa.gov>
Sent: Tuesday, February 13, 2018 12:09 PM
To: Molly Parker
Cc: Press; Bassler, Rachel
Subject: HUD-EPA Collaboration

Molly,

Please contact HUD with questions about their properties.

On background: On Jan. 11, 2017, EPA and HUD signed a Memorandum of Understanding titled “Improving Communication About Certain Public and HUD-Assisted Multifamily Housing Near Superfund Sites.” Under the MOU, “HUD and the Environmental Protection Agency (EPA) are working together to improve communication when either identifies a nexus between HUD Properties and NPL sites which EPA has identified as of potential health concern for housing residents.”

A copy of the MOU is available at https://www.hudexchange.info/resources/documents/Memorandum-of-Understanding-between-HUD-and-EPA-Regarding-Improving-Communication-About-Certain-Public-and-HUD-Assisted-Multifamily-Housing-Near-Superfund-Sites.pdf<https://urldefense.proofpoint.com/v2/url?u=https-3A__www.hudexchange.info_resources_documents_Memorandum-2Dof-2DUnderstanding-2Dbetween-2DHUD-2Dand-2DEPA-2DRegarding-2DImproving-2DCommunication-2DAbout-2DCertain-2DPublic-2Dand-2DHUD-2DAssisted-2DMultifamily-2DHousing-2DNear-2DSuperfund-2DSites.pdf&d=DwMGaQ&c=UCja3IwhyjPGYeHcG7oIbg&r=GIXIxm6qbGWrhmqPrx57hAkQnW2OLzuIT53pGqgYhKw&m=1pQuydt35tA7xpkmZGQ1un3mpmmdDPcxGGl3Nj5iDIw&s=_DP4ZNZ6OJ_31GRz4IoZzqPUwMcRR4fLaGg5LrvZiMk&e=>.

You can find information on EPA’s work at Superfund sites at https://www.epa.gov/superfund/search-superfund-sites-where-you-live<https://urldefense.proofpoint.com/v2/url?u=https-3A__www.epa.gov_superfund_search-2Dsuperfund-2Dsites-2Dwhere-2Dyou-2Dlive&d=DwMGaQ&c=UCja3IwhyjPGYeHcG7oIbg&r=GIXIxm6qbGWrhmqPrx57hAkQnW2OLzuIT53pGqgYhKw&m=1pQuydt35tA7xpkmZGQ1un3mpmmdDPcxGGl3Nj5iDIw&s=OqZ0aKpotcaNqGH4jITXc_BbW88B9b2pZ3EcOwK8fsg&e=>.

My primary questions are: Where does the evaluation of these sites identified in this draft list stand? Has EPA started these evaluations, and have any of them concluded? Have the property owners or housing authorities been notified of the results? Have residents been notified? (I may have follow up questions, but for starters, I’m trying to understand where things are in the process concerning this list).

Molly

Molly Parker

Reporter,

The Southern Illinoisan/

Lee Enterprises &

ProPublica Local Reporting Network

Ex. 6 - Personal Privacy

Message

From: Grantham, Nancy [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=12A3C2ED7158417FB0BB1B1B72A8CFB0-GRANTHAM, NANCY]
Sent: 9/19/2017 7:44:12 PM
To: Press [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b293283291dc44e0b5d1c36be9281d8a-Press]
Subject: FW: NPR/StateImpact interview on Superfund program

This is closed – Kell did interview with reporter – facilitated by Jahan thanks ng

Nancy Grantham
Office of Public Affairs
US Environmental Protection Agency
202-564-6879 (desk)
Ex. 6 - Personal Privacy

From: Jones, Enesta
Sent: Tuesday, September 19, 2017 11:51 AM
To: Grantham, Nancy <Grantham.Nancy@epa.gov>
Cc: AO OPA Media Relations <AO_OPA_Media_Relations@epa.gov>
Subject: Re: NPR/StateImpact interview on Superfund program

Nancy, he responded:

I'm interested in Superfund generally, funding, the task force's recommendations and the top-10 list.

On Sep 19, 2017, at 11:36 AM, Grantham, Nancy <Grantham.Nancy@epa.gov> wrote:

Enesta,

Can you contact the reporter for specific questions? Thanks ng

Nancy Grantham
Office of Public Affairs
US Environmental Protection Agency
202-564-6879 (desk)
Ex. 6 - Personal Privacy

> Hi Kell,
>
> Would you be able to do this interview from CO? I would be on the phone with you? Ken thinks you should do. Thanks ng
>
> **Nancy Grantham**
> **Office of Public Affairs**
> **US Environmental Protection Agency**
> **202-564-6879 (desk)**
> Ex. 6 - Personal Privacy
>
> **From:** Sorokin, Nicholas
> **Sent:** Monday, September 18, 2017 10:11 AM

To: Grantham, Nancy <Grantham.Nancy@epa.gov>
Subject: FW: NPR/StateImpact interview on Superfund program

Hi Nancy,

Here is the Wertz inquiry.

From: Joe Wertz [mailto: Ex. 6 - Personal Privacy
Sent: Thursday, September 7, 2017 10:31 AM
To: Press <Press@epa.gov>
Subject: re: NPR/StateImpact interview on Superfund program

Hello,

I'm working on a story about the national Superfund program and wanted to schedule an interview with someone at EPA. I'm centering at least some of my story around Tar Creek, and I know agency officials were recently on-site.

Think we could set something up? Possibly with Albert Kelly or Ken Wagner?

Best,

Joe

—
Joe Wertz
Senior Reporter & Managing Editor
StateImpact Oklahoma

Ex. 6 - Personal Privacy

Message

From:	Bowman, Liz [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=C3D4D94D3E4B4B1F80904056703EBC80-BOWMAN, ELI]
Sent:	8/24/2017 8:11:28 PM
To:	Eilperin, Juliet [Ex. 6 - Personal Privacy]
Subject:	RE: Follow-Up on Grants Story

Thanks for the response. I generally try to be as "hands off" as possible when recommending that career staff talk to reporters. They may ask that I join them on a call, but if they want to talk on the record, I don't have a problem with that. My guess is that they may want to be on background, or quoted as "senior agency career official in the office of general counsel" (for example), but I will let you work that out with them.

From: Eilperin, Juliet [mailto: Ex. 6 - Personal Privacy
Sent: Thursday, August 24, 2017 3:27 PM
To: Bowman, Liz <Bowman.Liz@epa.gov>
Subject: RE: Follow-Up on Grants Story

Dear Liz,
Thanks so much for this, and yes, given our ground rules, the only on-the-record quotes I will use will be the ones from you.

Today has been hugely frustrating because of the fact that Interior didn't release a single detail about its monument recommendations, and now I just got some new intel on this that I need to share with my editor. I'm going to do that and then start writing this story. I will try to reach out to a couple of folks you suggest below, though to be clear, none of them can talk on the record, right?

And as I mentioned, I'm headed to CO tomorrow, but basically, I will just work late on this tonight, I'm guessing, and should be pretty reachable aside from when I'm in the air. Also, there's a chance they will just pitch the story for early next week, if I can't get it all done today, which would give me more time to reach out to folks.
Thanks, Juliet

From: Bowman, Liz [mailto:Bowman.Liz@epa.gov]
Sent: Thursday, August 24, 2017 3:03 PM
To: Eilperin, Juliet <Ex. 6 - Personal Privacy>
Subject: Follow-Up on Grants Story

Juliet – **Off the record:** Since we all agreed the call was on background, the quotes you may use on the record are below (attributed to me, as agency spokesperson), along with additional background based on our discussions. I understand that you have spoken with some career employees already, but strongly suggest you also talk to the career staff who John works with on a daily basis, including lawyers and technical staff.

As you know, John's role in the public affairs office is focused on communications activities in the states and regions, which naturally includes grants, such as the Brownfields grants. Along those lines, I want to make sure you have a copy of the Inspector General report (attached) that came out yesterday, showing that improved management is needed and that millions of dollars is being mismanaged, and specifically that EPA's brownfields program is rife with what BNA reports as "confusion, inconsistency and lack of direction[news.bna.com]." This underscores John's role as a grants advisor on policy and general management issues, including for the brownfields and the tribal grants. John also plays a vital role in making the public aware of all the money EPA is allocating to local environmental projects through the grant program. Therefore, a list of press releases is also attached to highlight John's role in helping get these out the door and announced. As you can see by looking at how they picked up more and more each month he worked

on this, he really helps get the word out about the good work EPA is doing in local communities. Please let me know if you have any further questions. Thank you – Liz, Ex. 6 - Personal Privacy

On the Record: Quotes to attribute to Liz Bowman:
"Decisions about grants are to ensure funding is in line with the Agency's mission and policy priorities."

"I want to underscore the fact that a very select few have been rescinded. This is simply about being aware of how taxpayer money is being spent."

...agency was pulling back grants that were going to "international entities, without providing results for American taxpayers."

To address Ryan's comment: "We review grants to see if they are providing tangible results to the American people."

Bedbugs: "Let's be clear, we are talking about $20K for a one-day workshop on bedbugs."

Additional EPA Staff Available for Background Discussions:
Wendel Askew, Office of General Council, 202-564-3987, Askew.Wendel@epa.gov
Bruce Binder, Office of Grants and Department, 202-564-4935, Binder.Bruce@epa.gov
Ken Sylvester, Office of Grants and Debarment, 202-564-1902, sylvester.kenneth@epa.gov

Additional Background:
The previous administration insisted that all their work focus heavily on climate change, as outlined in their strategic plan and including in the grant-making process. As part of the change in policy focus, the attached memo has been drafted by the acting AA for the Office of International and Tribal Affairs (OITA) to explain the new guiding principles, which focuses on "tangible environmental results" – and should be applied as EPA provides grants to tribal governments. **As we discussed, this explains any review or holds of grants to ensure that they are in line with the Agency's current policy priorities.**

With regard to some of the grants that were rescinded or the tribal grants discussed that were held for review, the previous administration explained on the website that it provided grants to advance priorities such as "combating climate change by limiting pollutants."

International Grants and Cooperative Agreements[epa.gov]

EPA provides grants and enters into cooperative agreements that support protecting human health and the environment while advancing U.S. national interests through international environmental collaboration.
Our International Priorities[epa.gov] are:

- Building Strong Environmental Institutions and Legal Structures[epa.gov]
- Combating Climate Change by Limiting Pollutants[epa.gov]
- Improving Air Quality[epa.gov]
- Expanding Access to Clean Water[epa.gov]
- Reducing Exposure to Toxic Chemicals[epa.gov]
- Cleaning Up Electronic Waste (E-Waste)[epa.gov]

Strategic Plan FY14-FY18 (please see page 19 of the PDF, under adaptation):[epa.gov]

Adaptation initiatives undertaken by EPA national

programs and regional offices will carry out key elements of the President's Climate Action Plan (June 2013) and aim to increase the resilience of communities and ecosystems to climate change by increasing their ability to anticipate, prepare for, respond to, and recover from the impacts of a changing climate. EPA is encouraging and supporting smarter, more resilient investments by integrating considerations of climate change impacts and adaptive measures into major grant, loan, contract, and technical assistance programs, consistent with existing authorities. For example, EPA is integrating climate adaptation criteria into the Clean Water and Drinking Water State Revolving Loan Funds and grants for brownfields cleanup. EPA is also partnering with states, tribes, and urban and rural communities to integrate climate change data, models, information, and other decision-support tools into their planning processes in ways that empower them to anticipate, prepare for, and adapt to a changing climate.

NATIONAL RELEASES

APRIL- EPA Announces Grants to Reduce Emissions from Diesel Engines[epa.gov]
MAY- Water Infrastructure Investment in City of Joshua, TX Protects the Environment and Sparks Economic Growth[epa.gov]
MAY- EPA Awards Grant to Albemarle - Pamlico National Estuary Partnership: Protecting Natural Resources and Strengthening Local Economies[epa.gov]
MAY- EPA Awards Multi-Million Dollar Grant to North Carolina to Protect Water Quality[epa.gov]
JUNE- Organizations Across the Country Seek to Improve Water Infrastructure, Grow Local Economies[epa.gov]
JULY- EPA Selects 12 Projects to Apply for Water Infrastructure Loans[epa.gov]

REGION 1

MARCH- EPA Awards $3.3 Million in Wetlands Grants to Help State and Tribal Wetland Programs in New England[epa.gov]
APRIL- New EPA Funding Opportunity for Coastal Watershed Restoration in Southeast New England[epa.gov]
MAY- EPA Provides Brownfields Grants and Assistance to Connecticut Communities[epa.gov]
MAY- EPA Provides Brownfields Grant and Assistance to Two NH Communities[epa.gov]
MAY- EPA Provides Brownfields Grant and Assistance to Three Vermont Communities[epa.gov]
MAY-EPA Provides Brownfields Grants and Assistance to Rhode Island Communities[epa.gov]
MAY- EPA Provides Brownfields Grant and Assistance to Mass. Communities[epa.gov]
MAY- EPA Takes Steps to Improve Water Quality in Mystic Tributaries Downstream of Belmont, Mass.[epa.gov]
MAY- EPA Selects Lawrence, Mass. Group for Brownfields Job Training Grant[epa.gov]
MAY- EPA Provides Brownfields Grant and Assistance to Maine Communities[epa.gov]
JUNE- EPA to Help Bangor and Waterville, Maine Improve Health, Environment and Revitalize Local Economy[epa.gov]
JUNE- EPA Provides Brownfields Grant and Assistance to three Vermont Communities[epa.gov]
JUNE- Economically Disadvantaged Communities in Maine Receive $1.1 Million to Redevelop Contaminated Properties[epa.gov]
JUNE- City of Taunton, Mass. Receives $500,000 to Redevelop Contaminated Brownfield Sites[epa.gov]
JULY- EPA Provides Brownfields Grants to Western Massachusetts Communities[epa.gov]
JULY- EPA Provides Brownfields Grants to Maine Communities[epa.gov]
JULY- EPA Selects Biddeford, Maine Project to Apply for Low-Cost Water Infrastructure Loan[epa.gov]

JULY- Rhode Island Awarded $852,735 EPA Grant for Environmental Programs[epa.gov]
JULY- New Hampshire Awarded $936,308 EPA Grant for Environmental Programs[epa.gov]
JULY- EPA Provides Brownfields Grants to Woonsocket and Providence, Rhode Island[epa.gov]
JULY- EPA Awards $91,000 Environmental Education Grant to Woonasquatucket River Watershed Council in Providence, R.I.[epa.gov]
AUGUST- EPA Provides Brownfields Grant to Shelton, Conn.[epa.gov]

REGION 2

MARCH- EPA Provides Environmental Education Grants to Buffalo Niagara Riverkeeper and the Natural History Museum of the Adirondacks (The Wild Center)[epa.gov]
MAY- EPA Selects Sullivan County, New York to Receive a $200,000 Grant to Investigate Contaminated Properties[epa.gov]
MAY- EPA Selects Camden, New Jersey to Receive Grants Totaling $750,000 to Assess, Clean Up and Revitalize Contaminated Properties[epa.gov]
MAY- EPA Selects Trenton, New Jersey to Receive a $200,000 Grant to Clean Up and Revitalize Contaminated Property[epa.gov]
MAY- EPA Selects Cataño, Puerto Rico to Receive a $200,000 Grant to Investigate Contaminated Properties[epa.gov]
MAY- EPA Selects Maurice River Township, New Jersey to Receive Grants Totaling $400,000 to Assess, Clean Up and Revitalize Contaminated Properties[epa.gov]
MAY- EPA Selects Valley Falls, New York Receive a $200,000 Grant to Investigate Contaminated Property[epa.gov]
MAY- EPA Provides $200,000 for Green Job Training in New York City[epa.gov]
JUNE- Camden Redevelopment Agency to Receive $450,000 to Continue Work on Contaminated Brownfield Site[epa.gov]
JUNE- EPA Provides Environmental Programs in Puerto Rico with More than One Million Dollars to Improve Water Quality[epa.gov]
JUNE- EPA Provides Environmental Programs in N.Y. with $5.7 Million to Improve Water Quality[epa.gov]
JUNE- EPA Provides Environmental Programs in Puerto Rico with More than One Million Dollars to Improve Water Quality[epa.gov]
JUNE- EPA Provides Environmental Programs in Puerto Rico with More than One Million Dollars to Improve Water Quality[epa.gov]
JULY- EPA Grant Funds Teacher Training Through The College of New Jersey[epa.gov]
AUGUST- EPA Provides New Jersey $70 Million for Wastewater and Drinking Water Improvements[epa.gov]
AUGUST- EPA Provides New Jersey with Nearly $ 1.2 Million to Assess Contaminated Sites and Oversee Superfund Cleanups[epa.gov]
AUGUST- EPA Provides New York $186 Million for Wastewater and Drinking Water Improvements[epa.gov]

REGION 3

APRIL- EPA Brownfields Funding to Revitalize[epa.gov]
APRIL- EPA Funding to Revitalize Wilmington Brownfields[epa.gov]
MAY- EPA Brownfields Funding Announced for West Virginia[epa.gov]
MAY- EPA Brownfields Funding Announced for Western Pennsylvania[epa.gov]
MAY- EPA Awards Earth Conservancy in Ashley, Pa Environmental Workforce and Development Job Training Funding[epa.gov]
MAY- EPA Brownfields Funding Announced for Baltimore[epa.gov]
JUNE- EPA to Help Montgomery and Smithers, West Virginia Improve Health, Environment and Revitalize Local Economy[epa.gov]
JULY- Baltimore City One of 12 Selected by EPA To Apply For New Water Infrastructure Funding[epa.gov]
JULY- EPA Awards $91,000 Environmental Education Grant to Alvernia University in Reading, Pennsylvania[epa.gov]
AUGUST- Pittsburgh gets $600,000 in EPA Brownfields Grants to assess properties[epa.gov]
AUGUST- EPA Announces Funding of More Than $3.5 Million for DC Water Projects[epa.gov]

REGION 4

FEBRUARY- EPA Awards $1.09 million DERA Grant to Gees Bend Ferry in Wilcox County, AL[epa.gov]
MAY- EPA Brownfields Funding Announced for Eight Communities in Mississippi[epa.gov]
MAY- EPA Brownfields Funding Announced for Five Communities in North Carolina[epa.gov]

MAY- EPA Brownfields Funding Announced for Three Communities in South Carolina[epa.gov]
MAY- EPA Brownfields Funding Announced for Eau Claire, Green Bay, Sheboygan, Washington County and Wauwatosa[epa.gov]
MAY- EPA Brownfields Funding Announced for Four Communities in Kentucky[epa.gov]
MAY-EPA Awards $1.15 Million to South Carolina to Protect Water Quality[epa.gov]
MAY- EPA Selects Florida State College at Jacksonville, Fla. for Job Training Grant[epa.gov]
JUNE- EPA Provides $1.38 Million to Florida's Environmental Programs[epa.gov]
JUNE- EPA to Help Kentuckians Improve Health, Environment and Revitalize Local Economy[epa.gov]
JUNE- $1 Million Grant will Help Mississippi Address Leaking Underground Petroleum Storage Tanks[epa.gov]
JUNE- EPA to Help Greensboro, AL Improve Health, Environment and Revitalize Local Economy[epa.gov]
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JULY- EPA Awards $550,000 to Wisconsin for Coastal Wetland Projects[epa.gov]
JULY- EPA Awards $120,000 to Illinois for Project in Waukegan Harbor[epa.gov]
JULY- EPA selects Indiana Finance Authority to apply for $436M water infrastructure loan[epa.gov]
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MAY- Laramie, Wyoming receives $300K for environmental assessment and property redevelopment[epa.gov]
JUNE- Great Falls and north-central Montana communities receive $1M for revitalization projects[epa.gov]
JUNE- EPA awards Wyoming Department of Environmental Quality $850k grant to protect water quality[epa.gov]
JULY- EPA awards North Dakota Department of Health nearly $3.9M to protect water quality[epa.gov]
JULY- EPA awards South Dakota Department of the Environment and Natural Resources over $2.5M grant to protect water quality[epa.gov]
JULY- EPA awards Montana Department of Environmental Quality over $2M grant to protect water quality[epa.gov]
AUGUST- $1.6M grant to help Wyoming address Leaking Underground Petroleum Storage Tanks[epa.gov]
AUGUST- Logan River watershed receives portion of $1m grant for water quality improvement projects[epa.gov]

REGION 9

FEBRUARY- EPA awards $380,000 to Diné College for abandoned uranium mine study[epa.gov]
MARCH- EPA awards nearly $1 million to Commonwealth of Northern Mariana Islands[epa.gov]
APRIL- U.S. EPA awards $300,000 to East Bay small business that harnesses microbes for green chemistry[epa.gov]
APRIL- EPA awards nearly $1.3 million to Guam for environmental protection[epa.gov]
MAY- U.S. EPA Selects East Bay Group for Environmental Job Training Grant[epa.gov]
MAY- U.S. EPA Announces $300,000 in Brownfields Grants to Promote Economic Redevelopment in Bakersfield[epa.gov]
MAY- U.S. EPA Announces $300,000 in Brownfields Grants to the City of Pittsburg to Revitalize its Northern Industrial Waterfront[epa.gov]
MAY- U.S. EPA Announces $900,000 to the Honolulu Authority for Rapid Transportation to Assess and Clean Up Contaminated Sites in Oahu[epa.gov]
MAY- U.S. EPA Announces $1.9 Million in Brownfields Grants to Promote Economic Redevelopment Across Northern California[epa.gov]
MAY- U.S. EPA Announces $1.4 Million in Brownfields Grants to Promote Economic Redevelopment in Southern California Communities[epa.gov]
MAY- U.S. EPA Announces $300,000 in Brownfields Grants to Promote Economic Redevelopment in the City of Sacramento[epa.gov]
MAY- U.S. EPA Announces $1.2 million in Brownfields Grants to Promote Economic Redevelopment in Carson City, Douglas and Nye Counties[epa.gov]
MAY- U.S. EPA Announces $900,000 in Brownfields Grants to Promote Economic Redevelopment in Arizona[epa.gov]
MAY- U.S. EPA Announces $7.2 Million in Brownfields Grants to Promote Economic Redevelopment Across the Pacific Southwest[epa.gov]
JUNE- EPA awards over $866,000 to American Samoa for environmental protection[epa.gov]
JUNE- U.S. EPA awards $300,000 to clean up lead in Humboldt County[epa.gov]
JUNE- U.S. EPA Awards More than $320,000 to California, Arizona Tribes to Reduce Diesel Emissions[epa.gov]
JUNE- U.S. EPA Awards $91,000 to Groundwork San Diego to Educate Students and Community on Water Conservation[epa.gov]
JULY- EPA Selects Orange County Project to Apply for Water Infrastructure Loan[epa.gov]
JULY- EPA Selects San Diego Project to Apply for Water Infrastructure Loan[epa.gov]
JULY- EPA Selects San Francisco Project to Apply for Water Infrastructure Loan[epa.gov]
JULY- EPA Selects Morro Bay Project to Apply for Water Infrastructure Loan[epa.gov]
AUGUST- U.S. EPA awards $200,000 to improve Lake Tahoe's clarity[epa.gov]
AUGUST- EPA Awards Arrow Indian Contractors $3.85 Million for Abandoned Uranium Mine Cleanup[epa.gov]
AUGUST- EPA Announces $2.86 Million to Improve Tribal Lands in Arizona[epa.gov]

REGION 10

MARCH- Alaska Selected to Receive $2.5 Million EPA Grant to Improve Air Quality in Fairbanks[epa.gov]
MARCH- Idaho Selected to Receive $2.5 Million EPA Grant to Improve Air Quality in Cache Valley[epa.gov]
MAY- EPA Selects Zender Environmental Health and Research Group for $200,000 Environmental Workforce Development and Job Training Grant[epa.gov]
MAY- Skamania County Selected for $300,000 in Brownfields Assessment Grants[epa.gov]

MAY- City of St. Helens Selected for $300,000 in Brownfields Assessment Grants[epa.gov]
MAY- City of Bremerton Selected for $300,000 in Brownfields Assessment Grants[epa.gov]
MAY- City of Eugene and Partners Selected for $500,000 in Brownfields Assessment Grants[epa.gov]
MAY- Grays Harbor Council of Governments Selected for $600,000 in Brownfields Assessment Grants[epa.gov]
MAY- EPA Selects Communities in Alaska, Oregon and Washington for Brownfields Assessment and Cleanup Grants[epa.gov]
JUNE- EPA awards $513K to Alaska & Washington tribes to protect communities from diesel emissions[epa.gov]
JULY- King County qualifies for $129 million from innovative EPA infrastructure loan for Georgetown wet weather treatment station[epa.gov]
AUGUST- EPA awards $1.1 million to Idaho to protect drinking water sources[epa.gov]

Message

From:	Bowman, Liz [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=C3D4D94D3E4B4B1F80904056703EBC80-BOWMAN, ELI]
Sent:	8/24/2017 7:03:10 PM
To:	Graham, Amy [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=26722dfde5b34925b0ad9a8dd4aff308-Graham, Amy]
Subject:	FW: Follow-Up on Grants Story
Attachments:	_epaoig_20170823-17-P-0368_cert.pdf; GAP Guiding Principles_Draft Memo 080817.docx; List of Grant Press Releases 8.24.17.docx

From: Bowman, Liz
Sent: Thursday, August 24, 2017 3:02 PM
To: Eilperin, Juliet < Ex. 6 - Personal Privacy >
Subject: Follow-Up on Grants Story

Juliet – **Off the record:** Since we all agreed the call was on background, the quotes you may use on the record are below (attributed to me, as agency spokesperson), along with additional background based on our discussions. I understand that you have spoken with some career employees already, but strongly suggest you also talk to the career staff who John works with on a daily basis, including lawyers and technical staff.

As you know, John's role in the public affairs office is focused on communications activities in the states and regions, which naturally includes grants, such as the Brownfields grants. Along those lines, I want to make sure you have a copy of the Inspector General report (attached) that came out yesterday, showing that improved management is needed and that millions of dollars is being mismanaged, and specifically that EPA's brownfields program is rife with what BNA reports as "confusion, inconsistency and lack of direction." This underscores John's role as a grants advisor on policy and general management issues, including for the brownfields and the tribal grants. John also plays a vital role in making the public aware of all the money EPA is allocating to local environmental projects through the grant program. Therefore, a list of press releases is also attached to highlight John's role in helping get these out the door and announced. As you can see by looking at how they picked up more and more each month he worked on this, he really helps get the word out about the good work EPA is doing in local communities. Please let me know if you have any further questions. Thank you – Liz, 202-309-3416

On the Record: Quotes to attribute to Liz Bowman:
"Decisions about grants are to ensure funding is in line with the Agency's mission and policy priorities."

"I want to underscore the fact that a very select few have been rescinded. This is simply about being aware of how taxpayer money is being spent."

...agency was pulling back grants that were going to "international entities, without providing results for American taxpayers."

To address Ryan's comment: "We review grants to see if they are providing tangible results to the American people."

Bedbugs: "Let's be clear, we are talking about $20K for a one-day workshop on bedbugs."

Additional EPA Staff Available for Background Discussions:

Wendel Askew, Office of General Council, 202-564-3987, Askew.Wendel@epa.gov
Bruce Binder, Office of Grants and Department, 202-564-4935, Binder.Bruce@epa.gov
Ken Sylvester, Office of Grants and Debarment, 202-564-1902, sylvester.kenneth@epa.gov

Additional Background:
The previous administration insisted that all their work focus heavily on climate change, as outlined in their strategic plan and including in the grant-making process. As part of the change in policy focus, the attached memo has been drafted by the acting AA for the Office of International and Tribal Affairs (OITA) to explain the new guiding principles, which focuses on "tangible environmental results" – and should be applied as EPA provides grants to tribal governments. **As we discussed, this explains any review or holds of grants to ensure that they are in line with the Agency's current policy priorities.**

With regard to some of the grants that were rescinded or the tribal grants discussed that were held for review, the previous administration explained on the website that it provided grants to advance priorities such as "combating climate change by limiting pollutants."

International Grants and Cooperative Agreements

EPA provides grants and enters into cooperative agreements that support protecting human health and the environment while advancing U.S. national interests through international environmental collaboration.
Our International Priorities are:

- Building Strong Environmental Institutions and Legal Structures
- Combating Climate Change by Limiting Pollutants
- Improving Air Quality
- Expanding Access to Clean Water
- Reducing Exposure to Toxic Chemicals
- Cleaning Up Electronic Waste (E-Waste)

Strategic Plan FY14-FY18 (please see page 19 of the PDF, under adaptation):

> *Adaptation initiatives undertaken by EPA national programs and regional offices will carry out key elements of the President's Climate Action Plan (June 2013) and aim to increase the resilience of communities and ecosystems to climate change by increasing their ability to anticipate, prepare for, respond to, and recover from the impacts of a changing climate. EPA is encouraging and supporting smarter, more resilient investments by integrating considerations of climate change impacts and adaptive measures into major grant, loan, contract, and technical assistance programs, consistent with existing authorities. For example, EPA is integrating climate adaptation criteria into the Clean Water and Drinking Water State Revolving Loan Funds and grants for brownfields cleanup. EPA is also partnering with states, tribes, and urban and rural communities to integrate climate change data, models, information, and other decision-support tools into their planning processes in ways that empower them to anticipate, prepare for, and adapt to a changing climate.*

NATIONAL RELEASES

APRIL- EPA Announces Grants to Reduce Emissions from Diesel Engines
MAY- Water Infrastructure Investment in City of Joshua, TX Protects the Environment and Sparks Economic Growth
MAY- EPA Awards Grant to Albemarle - Pamlico National Estuary Partnership: Protecting Natural Resources and Strengthening Local Economies
MAY- EPA Awards Multi-Million Dollar Grant to North Carolina to Protect Water Quality
JUNE- Organizations Across the Country Seek to Improve Water Infrastructure, Grow Local Economies
JULY- EPA Selects 12 Projects to Apply for Water Infrastructure Loans

REGION 1

MARCH- EPA Awards $3.3 Million in Wetlands Grants to Help State and Tribal Wetland Programs in New England
APRIL- New EPA Funding Opportunity for Coastal Watershed Restoration in Southeast New England
MAY- EPA Provides Brownfields Grants and Assistance to Connecticut Communities
MAY- EPA Provides Brownfields Grant and Assistance to Two NH Communities
MAY- EPA Provides Brownfields Grant and Assistance to Three Vermont Communities
MAY-EPA Provides Brownfields Grants and Assistance to Rhode Island Communities
MAY- EPA Provides Brownfields Grant and Assistance to Mass. Communities
MAY- EPA Takes Steps to Improve Water Quality in Mystic Tributaries Downstream of Belmont, Mass.
MAY- EPA Selects Lawrence, Mass. Group for Brownfields Job Training Grant
MAY- EPA Provides Brownfields Grant and Assistance to Maine Communities
JUNE- EPA to Help Bangor and Waterville, Maine Improve Health, Environment and Revitalize Local Economy
JUNE- EPA Provides Brownfields Grant and Assistance to three Vermont Communities
JUNE- Economically Disadvantaged Communities in Maine Receive $1.1 Million to Redevelop Contaminated Properties
JUNE- City of Taunton, Mass. Receives $500,000 to Redevelop Contaminated Brownfield Sites
JULY- EPA Provides Brownfields Grants to Western Massachusetts Communities
JULY- EPA Provides Brownfields Grants to Maine Communities
JULY- EPA Selects Biddeford, Maine Project to Apply for Low-Cost Water Infrastructure Loan
JULY- Rhode Island Awarded $852,735 EPA Grant for Environmental Programs
JULY- New Hampshire Awarded $936,308 EPA Grant for Environmental Programs
JULY- EPA Provides Brownfields Grants to Woonsocket and Providence, Rhode Island
JULY- EPA Awards $91,000 Environmental Education Grant to Woonasquatucket River Watershed Council in Providence, R.I.
AUGUST- EPA Provides Brownfields Grant to Shelton, Conn.

REGION 2

MARCH- EPA Provides Environmental Education Grants to Buffalo Niagara Riverkeeper and the Natural History Museum of the Adirondacks (The Wild Center)
MAY- EPA Selects Sullivan County, New York to Receive a $200,000 Grant to Investigate Contaminated Properties
MAY- EPA Selects Camden, New Jersey to Receive Grants Totaling $750,000 to Assess, Clean Up and Revitalize Contaminated Properties
MAY- EPA Selects Trenton, New Jersey to Receive a $200,000 Grant to Clean Up and Revitalize Contaminated Property
MAY- EPA Selects Cataño, Puerto Rico to Receive a $200,000 Grant to Investigate Contaminated Properties
MAY- EPA Selects Maurice River Township, New Jersey to Receive Grants Totaling $400,000 to Assess, Clean Up and Revitalize Contaminated Properties
MAY- EPA Selects Valley Falls, New York Receive a $200,000 Grant to Investigate Contaminated Property
MAY- EPA Provides $200,000 for Green Job Training in New York City
JUNE- Camden Redevelopment Agency to Receive $450,000 to Continue Work on Contaminated Brownfield Site
JUNE- EPA Provides Environmental Programs in Puerto Rico with More than One Million Dollars to Improve Water Quality
JUNE- EPA Provides Environmental Programs in N.Y. with $5.7 Million to Improve Water Quality
JUNE- EPA Provides Environmental Programs in Puerto Rico with More than One Million Dollars to Improve Water Quality

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JULY- EPA Grant Funds Teacher Training Through The College of New Jersey
AUGUST- EPA Provides New Jersey $70 Million for Wastewater and Drinking Water Improvements
AUGUST- EPA Provides New Jersey with Nearly $ 1.2 Million to Assess Contaminated Sites and Oversee Superfund Cleanups
AUGUST- EPA Provides New York $186 Million for Wastewater and Drinking Water Improvements

REGION 3

APRIL- EPA Brownfields Funding to Revitalize
APRIL- EPA Funding to Revitalize Wilmington Brownfields
MAY- EPA Brownfields Funding Announced for West Virginia
MAY- EPA Brownfields Funding Announced for Western Pennsylvania
MAY- EPA Awards Earth Conservancy in Ashley, Pa Environmental Workforce and Development Job Training Funding
MAY- EPA Brownfields Funding Announced for Baltimore
JUNE- EPA to Help Montgomery and Smithers, West Virginia Improve Health, Environment and Revitalize Local Economy
JULY- Baltimore City One of 12 Selected by EPA To Apply For New Water Infrastructure Funding
JULY- EPA Awards $91,000 Environmental Education Grant to Alvernia University in Reading, Pennsylvania
AUGUST- Pittsburgh gets $600,000 in EPA Brownfields Grants to assess properties
AUGUST- EPA Announces Funding of More Than $3.5 Million for DC Water Projects

REGION 4

FEBRUARY- EPA Awards $1.09 million DERA Grant to Gees Bend Ferry in Wilcox County, AL
MAY- EPA Brownfields Funding Announced for Eight Communities in Mississippi
MAY- EPA Brownfields Funding Announced for Five Communities in North Carolina
MAY- EPA Brownfields Funding Announced for Three Communities in South Carolina
MAY- EPA Brownfields Funding Announced for Eau Claire, Green Bay, Sheboygan, Washington County and Wauwatosa
MAY- EPA Brownfields Funding Announced for Four Communities in Kentucky
MAY-EPA Awards $1.15 Million to South Carolina to Protect Water Quality
MAY- EPA Selects Florida State College at Jacksonville, Fla. for Job Training Grant
JUNE- EPA Provides $1.38 Million to Florida's Environmental Programs
JUNE- EPA to Help Kentuckians Improve Health, Environment and Revitalize Local Economy
JUNE- $1 Million Grant will Help Mississippi Address Leaking Underground Petroleum Storage Tanks
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REGION 8

MAY- Salish Kootenai College receives $198K for environmental job training program in Pablo, Montana
MAY- Bent County, Colorado cleanup project receives $132K to revitalize Fort Lyon campus
MAY- Laramie, Wyoming receives $300K for environmental assessment and property redevelopment
JUNE- Great Falls and north-central Montana communities receive $1M for revitalization projects
JUNE- EPA awards Wyoming Department of Environmental Quality $850k grant to protect water quality
JULY- EPA awards North Dakota Department of Health nearly $3.9M to protect water quality
JULY- EPA awards South Dakota Department of the Environment and Natural Resources over $2.5M grant to protect water quality
JULY- EPA awards Montana Department of Environmental Quality over $2M grant to protect water quality
AUGUST- $1.6M grant to help Wyoming address Leaking Underground Petroleum Storage Tanks
AUGUST- Logan River watershed receives portion of $1m grant for water quality improvement projects

REGION 9

FEBRUARY- EPA awards $380,000 to Diné College for abandoned uranium mine study
MARCH- EPA awards nearly $1 million to Commonwealth of Northern Mariana Islands
APRIL- U.S. EPA awards $300,000 to East Bay small business that harnesses microbes for green chemistry
APRIL- EPA awards nearly $1.3 million to Guam for environmental protection
MAY- U.S. EPA Selects East Bay Group for Environmental Job Training Grant
MAY- U.S. EPA Announces $300,000 in Brownfields Grants to Promote Economic Redevelopment in Bakersfield
MAY- U.S. EPA Announces $300,000 in Brownfields Grants to the City of Pittsburg to Revitalize its Northern Industrial Waterfront
MAY- U.S. EPA Announces $900,000 to the Honolulu Authority for Rapid Transportation to Assess and Clean Up Contaminated Sites in Oahu
MAY- U.S. EPA Announces $1.9 Million in Brownfields Grants to Promote Economic Redevelopment Across Northern California
MAY- U.S. EPA Announces $1.4 Million in Brownfields Grants to Promote Economic Redevelopment in Southern California Communities
MAY- U.S. EPA Announces $300,000 in Brownfields Grants to Promote Economic Redevelopment in the City of Sacramento
MAY- U.S. EPA Announces $1.2 million in Brownfields Grants to Promote Economic Redevelopment in Carson City, Douglas and Nye Counties
MAY- U.S. EPA Announces $900,000 in Brownfields Grants to Promote Economic Redevelopment in Arizona
MAY- U.S. EPA Announces $7.2 Million in Brownfields Grants to Promote Economic Redevelopment Across the Pacific Southwest

JUNE- EPA awards over $866,000 to American Samoa for environmental protection
JUNE- U.S. EPA awards $300,000 to clean up lead in Humboldt County
JUNE- U.S. EPA Awards More than $320,000 to California, Arizona Tribes to Reduce Diesel Emissions
JUNE- U.S. EPA Awards $91,000 to Groundwork San Diego to Educate Students and Community on Water Conservation
JULY- EPA Selects Orange County Project to Apply for Water Infrastructure Loan
JULY- EPA Selects San Diego Project to Apply for Water Infrastructure Loan
JULY- EPA Selects San Francisco Project to Apply for Water Infrastructure Loan
JULY- EPA Selects Morro Bay Project to Apply for Water Infrastructure Loan
AUGUST- U.S. EPA awards $200,000 to improve Lake Tahoe's clarity
AUGUST- EPA Awards Arrow Indian Contractors $3.85 Million for Abandoned Uranium Mine Cleanup
AUGUST- EPA Announces $2.86 Million to Improve Tribal Lands in Arizona

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MARCH- Alaska Selected to Receive $2.5 Million EPA Grant to Improve Air Quality in Fairbanks
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MAY- EPA Selects Zender Environmental Health and Research Group for $200,000 Environmental Workforce Development and Job Training Grant
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MAY- City of St. Helens Selected for $300,000 in Brownfields Assessment Grants
MAY- City of Bremerton Selected for $300,000 in Brownfields Assessment Grants
MAY- City of Eugene and Partners Selected for $500,000 in Brownfields Assessment Grants
MAY- Grays Harbor Council of Governments Selected for $600,000 in Brownfields Assessment Grants
MAY- EPA Selects Communities in Alaska, Oregon and Washington for Brownfields Assessment and Cleanup Grants
JUNE- EPA awards $513K to Alaska & Washington tribes to protect communities from diesel emissions
JULY- King County qualifies for $129 million from innovative EPA infrastructure loan for Georgetown wet weather treatment station
AUGUST- EPA awards $1.1 million to Idaho to protect drinking water sources

Message

From:	Lynn, Tricia [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=D8747BA49CDE485EA4AC58DBF09C3DCD-TRICIA SLUSSER]
Sent:	8/23/2017 3:32:30 PM
To:	scarignan@bna.com
Subject:	RE: PRP list
Attachments:	Responsible Parties at CERCLA Sites.pdf

See attached. EPA maintains a comprehensive list of responsible parties at Superfund sites that have received a General or Special Notice Letter and/or are a party to a completed enforcement action. The list is updated regularly and current as of July 11, 2017. It is available on EPA's website at: http://semspub.epa.gov/src/document/11/196731

From: Carignan, Sylvia [mailto:scarignan@bna.com]
Sent: Monday, August 21, 2017 3:15 PM
To: Press <Press@epa.gov>
Subject: PRP list

Hi EPA,

I'm interested in getting a list of PRPs at each Superfund site, much like the annual "Site Enforcement Tracking System: National PRP Listing" documents that can be found here: https://ntrl.ntis.gov/NTRL/

Is there an updated, public database like those annual lists?

Best,
Sylvia

>>>>>>>>>>>>>>>>>>>>>>>>>>>>>

Sylvia Carignan
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Bloomberg BNA
1801 S Bell St, Arlington VA 22202
Direct 703-341-3708

ORAL ARGUMENT SCHEDULED FOR MARCH 16, 2018

Nos. 17-1155, 17-1181

**UNITED STATES COURT OF APPEALS
FOR THE DISTRICT OF COLUMBIA CIRCUIT**

AIR ALLIANCE HOUSTON, *et al.*,

Petitioners,

v.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, *et al.*,

Respondents.

Petition for Review of Final Administrative Action of the United States Environmental Protection Agency

FINAL BRIEF OF RESPONDENT-INTERVENORS STATES OF LOUISIANA, ARIZONA, ARKANSAS, FLORIDA, KANSAS, THE COMMONWEALTH OF KENTUCKY BY AND THROUGH GOVERNOR BEVIN, OKLAHOMA, SOUTH CAROLINA, TEXAS, UTAH, WEST VIRGINIA, AND WISCONSIN

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CERTIFICATE AS TO PARTIES, RULINGS, AND RELATED CASES

Pursuant to Circuit Rule 28(a), Respondent-Intervenors States of Louisiana, Arizona, Arkansas, Florida, Kansas, the Commonwealth of Kentucky by and Through Governor Bevin, Oklahoma, South Carolina, Texas, Utah, West Virginia, and Wisconsin certify:

(A) Parties and Amici.

Except for the following, all parties, intervenors, and *amici* appearing before this Court are listed in the Brief for Community Petitioners.

Amici

No. 17-1155: Public Citizen Litigation Group; Institute for Policy Integrity at New York University School of Law (for petitioners).

No. 17-1181: Public Citizen Litigation Group; Institute for Policy Integrity at New York University School of Law (for petitioners).

(B) Rulings Under Review.

References to the rulings at issue appear in the Brief for Community Petitioners.

(C) Related Cases.

Respondent-Intervenors States are aware of the following related cases pending before this Court:

No. 17-1181 New York *et al.* v. EPA (consolidated with the lead case here, No. 17-1155).

In addition, the following set of cases has been consolidated as No. 17-1085:

No. 17-1085, American Chemistry Council v. EPA;

No. 17-1087, Chemical Safety Advocacy Group v. EPA;

No. 17-1088, Utility Air Regulatory Group v. EPA.

These cases seek judicial review of the EPA action entitled "Accidental Release Prevention Requirements: Risk Management Programs Under the Clean Air Act," 82 Fed. Reg. 4594 (Jan. 13, 2017).

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GLOSSARY

AG	Attorney General
CAA	Clean Air Act
Delay Rule	*Accidental Release Prevention Requirements: Risk Management Programs Under the Clean Air Act; Further Delay of Effective Date*, 82 Fed. Reg. 27,133 (June 14, 2017)
EPA or the Agency	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act, 42 U.S.C. §§ 11001-11050
OMB	Office of Management and Budget
OSHA	Occupational Safety and Health Administration
RMP	Risk Management Program
RMP Amendments	*Accidental Release Prevention Requirements: Risk Management Programs Under the Clean Air Act; Final rule*, 82 Fed. Reg. 4594 (Jan. 13, 2017)

JURISDICTIONAL STATEMENT

State Respondent-Intervenors adopt the Jurisdictional Statement in EPA's brief.

STATEMENT OF ISSUES

State Respondent-Intervenors adopt the Statement of Issues in EPA's brief.

STATUTES AND REGULATIONS

All applicable statutes and regulations are attached to EPA's brief.

STANDARD OF REVIEW

State Respondent-Intervenors adopt the Standard of Review in EPA's brief.

INTRODUCTION

The undersigned Respondent-Intervenor States (collectively "the States") respectfully submit this brief in support of Respondent United States Environmental Protection Agency ("EPA" or "the Agency"). State and local governments man the front lines of chemical facility accident prevention and response, community education, and emergency preparedness ensuring safety and security for their communities.

The States have been and remain strong and engaged supporters of efforts to regulate chemical facility safety for the benefit of the environment and surrounding communities. Our concern with the Risk Management Program (RMP)

Amendments[1] is that they do not further those efforts and may, in fact, frustrate their fundamental purpose. The States timely and dutifully brought their concerns to EPA's attention during the RMP Amendment rulemaking process, but those concerns fell on deaf ears. That is why we support the EPA's decision to revisit these issues, and the rulemaking specifically, to delay implementation of this regulation, while already extensive and protective regulations remain in place. We believe these amendments, if implemented, without delay serves only to introduce confusion and disruption into already robust emergency response and preparedness command structures in place in the States, causing an unnecessary but greatly detrimental drain on the resources of the States as well as a potential threat to security. Intending not to duplicate the arguments made by EPA and Industry Respondent-Intervenors, this brief focuses on the unique concerns of state agencies and law enforcement officials who administer the RMP program. The States support the Delay Rule[2] because it reflects EPA's reasoned judgment that the RMP Amendments warrant careful reconsideration and that a modest delay of the effective date is necessary to allow EPA to undertake such reconsideration. The Delay Rule ensures that provisions of the RMP Amendments that potentially threaten safety do not go into effect until EPA has a chance to address the serious

[1] 82 Fed. Reg. 4594 (Jan. 13, 2017) ("RMP Amendments") (JA93-JA204).
[2] 82 Fed. Reg. 27,133 (June 14, 2017) ("Delay Rule") (JA5-JA16).

concerns that states raised to EPA that were either ignored or not addressed adequately in the final rule.

Against this backdrop, the limited 20-month delay of the RMP Amendments constitutes a reasonable and prudent exercise of EPA's inherent authority to reconsider regulations. The delay is well within EPA's statutory authority to promulgate RMP regulations and set RMP effective dates based upon considerations of practicability. EPA articulated sufficient justification for the Delay Rule, including the need to re-evaluate based on significant concerns raised by States and other stakeholders during the rulemaking. Furthermore, the Delay Rule's impact on implementation of the substantive provisions of the RMP Amendments is limited, given that most all of the rule's core provisions were not scheduled to take effect until 2021 at the earliest. 82 Fed. Reg. at 27,139 (JA11).

STATEMENT OF THE CASE

State Respondent-Intervenors adopt EPA's Statement of Facts and emphasize the following:

Many of the States participated actively in the rulemaking process for the RMP Amendments since EPA published its Notice of Proposed Rulemaking in March 2016.[3] In response to this proposal, numerous state officials—including current EPA Administrator Scott Pruitt, then Attorney General ("AG") for

[3] 81 Fed. Reg. 13,638 (Mar. 14, 2016) (JA18-JA92).

Oklahoma, as well as AGs from Louisiana, Kansas, Alabama, Nevada, Arizona, South Carolina, Arkansas, Utah, Florida, Wisconsin, Texas, and Georgia—submitted comments on the proposed rule, expressing significant concerns with proposed information disclosure requirements and other issues in the rule.[4] These government partners of EPA also took the unusual step of meeting with the Office of Management and Budget ("OMB") as it completed its review of the RMP Amendments specifically to emphasize their concerns and because EPA had undertaken no outreach to its state partners after receiving comments. Despite the significant concerns articulated by numerous stakeholders, EPA finalized the amendments with only slight modifications, in some instances *increasing* the risks and burdens of the rule as proposed. EPA did not dispute that it failed to coordinate the rule with first responders, federal and state agencies, did not consider its impact on existing incident command structures, and did not evaluate those costs, but nevertheless, rushed the rule into effect at the eleventh hour of the last administration.

Following the rule's issuance on the eve of the administration change, several states filed administrative petitions for reconsideration, again raising a host

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[4] *See, e.g.*, *See* Letter from Jeff Landry and Ken Paxton, Attorneys General of Louisiana and Texas, to Gina McCarthy, Adm'r, EPA (May 3, 2016), Docket No. EPA-HQ-OEM-2015-0725-0433 ("Landry and Paxton Letter") (JA744-JA746); Letter from Scott Pruitt, AG, State of Oklahoma, *et al.* to Gina McCarthy, Adm'r, EPA (July 27, 2016), Docket No. EPA-HQ-OEM-2015-0725-0624 ("Pruitt Letter") (JA779-JA780).

of substantive concerns with the final rule, including EPA's failure to respond to our significant comments and highlighting errors in the final rule as issued. The States' petition addressed the anticipated impact of the rule on first responders and explained that the release of security-sensitive information mandated by the final rule would endanger both the public and first responders.[5] Specifically, the States raised the following:

- The information disclosure provisions in the RMP Amendments threaten homeland security by making covered facilities less safe, (JA1274-JA1275);
- The coordination and emergency response provisions in the RMP Amendments fail to account for overlapping requirements of the Emergency Planning and Community Right-to-Know Act ("EPCRA") and other laws touching upon emergency response, and constitute unfunded mandates that impose unjustified burdens on state and local emergency response and planning organizations, (JA1275-JA1276);
- The RMP Amendments are unsupported by accurate costs and benefits estimates, as required under applicable laws, (JA1276); and
- Several problematic provisions in the RMP Amendments were finalized without being offered for comment in the Proposed Rule, (JA1276).

[5] Louisiana, *et al.*, Pet. for Reconsideration and Stay, (Mar. 14, 2017), Docket No. EPA-HQ-OEM-2015-0725-0762 (JA1272-JA1276).

Administrator Pruitt granted our petitions for reconsideration as well as a three-month stay of the Amendments. He subsequently published a notice of proposed rulemaking for the Delay Rule, proposing to delay the RMP Amendments by 20 months, to February 19, 2019.[6] The Delay Rule, which is the only rule at issue here, was finalized in June 2017, after a public hearing and comment period. It delayed the effective date of the RMP Amendments generally, but in practical effect narrowly affected only one compliance date, the additional emergency response coordination requirements (March 14, 2018 compliance date), as well as changes to regulatory definitions and other related minor modifications. 82 Fed. Reg. at 27,133 (JA5).

The Delay Rule allows EPA much-needed time to consider carefully the onerous, and in our view, counterproductive, provisions of the RMP Amendments to determine whether their substantial compliance burdens and security risks are adequately justified by whatever benefits the rule might offer. It also alleviates the risk that state and local emergency response resources will be committed to implement changes necessary to ensure compliance with regulatory provisions in the RMP Amendments that may then change again as a result of the reconsideration proceedings. Not only are such changes a waste of limited resources, but they add confusion to any emergency response.

[6] 82 Fed. Reg. 16,146 (Apr. 3, 2017) (JA1-JA4).

SUMMARY OF ARGUMENT

EPA acted well within its authority under the Clean Air Act ("CAA") to adopt the Delay Rule, and its action was eminently reasonable and thus not arbitrary and capricious. The States and other stakeholders articulated during the rulemaking process the numerous practicability concerns presented by the rules, including that the new coordination and emergency response provisions impose new regulatory burdens without any identifiable, commensurate benefits; the fact that the information disclosure requirements in the Amendments threaten the security of covered facilities; and that the Amendments create duplicative burdens for state and local emergency response organizations, given that they overlap with existing requirements under state and federal law. EPA was thus not only authorized to issue the Delay Rule but its decision to do so was necessitated under the circumstances.

ARGUMENT

I. Petitioners Fail to Demonstrate that EPA Lacked Authority To Delay the Effective Date of the RMP Amendments or That EPA's Action Was Arbitrary and Capricious.

The States support EPA and Industry-Intervenors' legal arguments with respect to EPA's authority under the CAA to adopt the Delay Rule. First, CAA Section 112(r)(7) confers upon EPA broad discretion to issue "reasonable" RMP regulations and, in promulgating such requirements, to establish "an effective date, as determined by the Administrator, assuring compliance *as expeditiously as*

practicable." 42 U.S.C. § 7412(r)(7)(A); (B)(i) (emphasis added). The plain language of CAA Section 112(r)(7) reflects Congress's clear intent to confer discretion to implement appropriate RMP regulations, including determining the factors relevant to establishing a "practicable" effective date. Second, EPA clearly met the "narrow" standard for "arbitrary and capricious" review, by "examin[ing] the relevant data and articulat[ing] a satisfactory explanation for its action." *F.C.C. v. Fox Television Stations, Inc.*, 556 U.S. 502, 513 (2009) (citation omitted). Indeed, not only was EPA's decision not arbitrary and capricious, but it was an eminently reasonable and appropriate exercise of discretion to preserve the status quo.

The States write here to emphasize (1) that the current regulatory structure provides significant protections and an adequate framework for communication, coordination, and response to emergency situations that threaten public safety, such that a delay in the RMP Amendments is reasonable and (2) specific aspects of the RMP Amendments that present practical implementation concerns for states, making compliance with the regulation impracticable in the time period allotted. *See* Attachment A, Declaration of James Waskom, Director, Office of Homeland Security, State of Louisiana (Dec. 20, 2017). Together, these support the reasonableness of EPA's decision that a finite 20-month delay is appropriate to complete reconsideration of these core issues.

A. Practicability and the Compliance Deadlines

EPA reasonably exercised the discretion conferred by CAA Section 112(r)(7) in determining that an earlier effective date for the RMP Amendments would not be "practicable." 82 Fed. Reg. at 27,136 ("[W]e conclude that the delay of effectiveness for 20 months is as expeditious as practicable for allowing the [RMP Amendments] to go into effect.") (JA8). This determination was supported by EPA's recognition of the significant burdens and risks that the RMP Amendments would create for the regulated community, surrounding communities, and State/local emergency responders without proportional benefits.

As EPA noted in the Delay Rule, considerations of practicability under CAA Section 112(r)(7) do not prohibit "weighing the difficulties of compliance planning and other implementation issues," which are key considerations with respect to the proper effective date for the RMP Amendments. 82 Fed. Reg. at 27,137 (JA9). There are numerous implementation issues that make compliance with the Amendments as promulgated not "practicable" within the timeframes provided. In particular, the coordination and emergency response provisions in the RMP Amendments, which are slated to become effective March 14, 2018, will tax state and local emergency response resources. Because there is no provision for funding support of state and local emergency response personnel, these provisions are essentially unfunded mandates that will divert planning and preparedness resources

from the entities that need them most—those charged with community emergency response.[7]

Further, it is appropriate for EPA to consider, in analyzing the practicability of compliance with the RMP Amendments as promulgated, the numerous overlapping emergency response coordination and preparedness requirements in other regulations and statutes. *See, e.g.*, EPA, General RMP Guidance - Chapter 8: Emergency Response Program (Apr. 2004), at 8-8, *available at* https://www.epa.gov/sites/production/files/2013-11/documents/chap-08-final.pdf (listing federal emergency planning regulations). These include the provisions of EPCRA, federal and state workplace safety requirements, and other state and local emergency preparedness requirements.

Aside from the obvious resource burdens, the overlap and confusion created by these duplicative requirements in the event of an actual emergency at a covered facility is a significant consideration in determining whether compliance is "practicable" at this time. Emergency situations pose inherently complex problems that require integrated, efficient, multifaceted response and depends heavily on quick and coordinated responses. Waskom Decl. ¶10. In the States' experience,

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[7] *See, e.g.*, Comments of Nat'l Ass'n of SARA Title III Program Officials on RMP Amendments Proposed Rule at 4 (May 12, 2016), Docket No. EPA-HQ-OEM-2015-0725-0510 (noting that the Emergency Response Preparedness Provisions of the RMP Amendments "are unworkable and . . . create unnecessary and substantial burdens on LEPCs and first responders") (JA749).

emergency response protocols are only effective where the chain of command is clear and there has been adequate time to practice and adapt to new roles and responsibilities.[8] The new requirements of the RMP Amendments would create an overlay to the currently-existing incident comment structure, and it is not clear how these mandates would fit within the structure set forth under current law. The resulting confusion and duplication make emergency response organizations *less* effective than they are currently. Waskom Decl. ¶11 ("[A]dditional mandates of the RMP Amendments will likely cause confusion for responders and planning organizations, as it is not clear how these mandates fit within the existing incident command structure prescribed under current law."). Further, the States believe that current legal requirements create an effective framework for emergency response. Waskom Decl. ¶7.

The Delay Rule is thus necessary to ensure not only that the emergency response and coordination provisions of the RMP Amendments are practicable—when considered carefully in relation to existing legal requirements and protocols—but also that these provisions do not create confusion among

[8] This basic principle was driving force behind the passage of the Homeland Security Act of 2002, 6 U.S.C. §§ 101-557 (2002). *See* § 314(a)(5) where the Act requires "building a comprehensive incident management system with Federal, State, and local government personnel, agencies, and authorities, to respond to [terrorist] attacks and disasters."

responders, thereby reducing the effectiveness of their response efforts in the event of a chemical facility accident.

B. Reasoned Decision-Making

EPA's action easily satisfies the legal standards to show that it is neither arbitrary nor capricious, as its justification for the Delay Rule is both adequate and reasonable. Furthermore, given the objections that were raised prior to issuance and in the reconsideration petitions, EPA's only responsible choice was to delay the effective date. Indeed, the Delay Rule reflects EPA's responsiveness to the significant concerns raised by the States, including:

- EPA's decision to finalize facility information disclosure and other requirements in the RMP Amendments that were not included for public comment in the Proposed Rule (*see* 82 Fed. Reg. at 27,137) (JA9);
- Facility security risks potentially created by the RMP Amendments that were not adequately addressed by EPA in the rulemaking process (*see* 82 Fed. Reg. at 27,138) (JA10);
- Insufficient cost-benefit analysis in support of the RMP Amendments, including a failure of EPA to quantify the benefits of the rule and the Agency's failure to fulfill its statutory obligations to consider the impacts of the rule on small businesses (*see id.*); and

- State agencies' concerns that the RMP Amendments created unjustified burdens on state and local emergency responders (*see id.*).

These concerns cast serious doubt upon the necessity for and prudence of the RMP Amendments and support the soundness of EPA's decision to delay their effectiveness.[9] *See* 82 Fed. Reg. at 27,139 ("Petitioners' claims that the new final rule provisions may cause harm to regulated facilities and local communities, and the speculative but likely minimal nature of the forgone benefits, form another rational basis for EPA to delay the effectiveness of the [RMP] Amendments and determine whether they remain consistent with the policy goals of the Agency.") (JA11); *see also* Waskom Decl. ¶13 (RMP Amendments prescribe the public disclosure of sensitive chemical facility information in a manner that could allow wrongdoers to target and exploit [any] security vulnerabilities at the facility, harming the surrounding community."); ¶18 ("RMP Amendments, if allowed to take effect within the timeframes originally prescribed, would not only pose significant risks to the safety of the communities in the vicinity of regulated facilities but would also burden state and local emergency response organizations,

[9] Note that while the State Respondent-Intervenors are concerned about the stated issues in the RMP Amendments, the Delay Rule will not impact the timing of the effectiveness of many of these provisions. The harm of delaying effectiveness is speculative and insubstantial because any suggested benefit of the Amendments would not occur until 2021, which consequently may bring Petitioners' standing to bring their challenge to the Delay Rule into question.

diminishing their ability to allocate scarce resources effectively."). EPA reasonably and adequately explained that because the process of "evaluating these issues will be difficult and time consuming," a delay is warranted to allow "a comprehensive review of objections ... without imposing the rule's substantial compliance and implementation resource burden when the outcome of the review is pending." 82 Fed. Reg. at 27,136 (JA8).

Petitioners' assertion that "facilities and emergency responders will be less safe" because of the Delay Rule is simply unsupported by the record and, in fact, the record shows that allowing the rule to go into effect without meaningful reconsideration that is required here puts facilities and citizens of the States submitting this brief in jeopardy. Waskom Decl. ¶18. Several of the States submitted ample record evidence during the rulemaking process that in fact the *opposite* is true, *i.e.* the RMP Amendments risk making facilities and emergency responders less safe through its ill-conceived information disclosure requirements and through the diversion of emergency response resources. *See, e.g., supra* note 4 (Landry and Paxton Letter (JA744-JA746); and Pruitt Letter (JA779-JA780).

Further, the Delay Rule does not impact the effectiveness of the currently-applicable RMP requirements, *see* Waskom Decl. ¶7, which EPA has repeatedly acknowledged "have been effective in preventing and mitigating chemical accidents in the United States." 82 Fed. Reg. at 27,136 (citing 82 Fed. Reg. at

4595) (JA8); *see also* Waskom Decl. ¶¶7, 9. EPA therefore acted reasonably in issuing the Delay Rule and, in fact, would have been *un*reasonable in failing to do so.

CONCLUSION

For the foregoing reasons, the States submit that the petitions should be dismissed or denied.

Respectfully submitted,

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CERTIFICATE OF COMPLIANCE WITH WORD LIMITATIONS AND TYPEFACE REQUIREMENTS

Pursuant to Rule 32(a), (f), and (g) of the Federal Rules of Appellate Procedure and Circuit Rules 32(e)(1) and 32(e)(2)(C), I hereby certify that the foregoing Final Brief of Respondent-Intervenors States of Louisiana, Arizona, Arkansas, Florida, Kansas, the Commonwealth of Kentucky by and through Governor Bevin, Oklahoma, South Carolina, Texas, Utah, West Virginia, and Wisconsin contains 3,018 words, as counted by a word processing system that includes headings, footnotes, quotations, and citations in the count.

I also certify that this brief complies with the word-count limitation of Fed. R. App. P. 32(e) as modified by this Court's September 26, 2017 order, in that, this brief and the brief for the Industry Intervenors together contain less than 11,000 words, as required by this Court's September 26 order.

I also certify that this brief complies with the typeface and type-style requirements of Rule 32(a)(5) and (6) of the Federal Rules of Appellate Procedure because it has been prepared in a proportionally spaced typeface using Microsoft Word™ 2010 with 14-point Times New Roman font.

/s/ Elizabeth B. Murrill
Elizabeth B. Murrill

CERTIFICATE OF SERVICE

I hereby certify that, on this 31st day of January 2018, a copy of the foregoing Final Brief of Respondent-Intervenors States of Louisiana, Arizona, Arkansas, Florida, Kansas, the Commonwealth of Kentucky by and Through Governor Bevin, Oklahoma, South Carolina, Texas, Utah, West Virginia, and Wisconsin was served electronically through the Court's CM/ECF system on all ECF-registered counsel.

/s/ Elizabeth B. Murrill
Elizabeth B. Murrill

IN THE UNITED STATES COURT OF APPEALS
FOR THE DISTRICT OF COLUMBIA CIRCUIT

AIR ALLIANCE HOUSTON, *et al.*, Petitioners, **v.** **UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, *et al.*,** Respondents.	**Case No. 17-1155 (consolidated with Case No. 17-1181)**

. **DECLARATION OF JAMES WASKOM**

IN THE UNITED STATES COURT OF APPEALS
FOR THE DISTRICT OF COLUMBIA CIRCUIT

AIR ALLIANCE HOUSTON, et al., Petitioners, v. UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, et al., Respondents.	CASE NO. 17-1155 (and consolidated cases)

DECLARATION OF JAMES WASKOM

I, James Waskom, declare as follows:

1. I have personal knowledge of the facts set forth in this declaration, and could and would competently testify thereto if called upon to do so.

2. I am the Director of the State of Louisiana Governor's Office of Homeland Security and Emergency Preparedness ("GOHSEP"). I have served in this capacity since appointed by Governor John Bel Edwards on January 11, 2016.

3. In my role as GOHSEP Director, I am responsible for homeland security and emergency and disaster preparedness and response for the State of Louisiana, overseeing the coordination of the State's activities to prevent, prepare for, respond to, recover from and mitigate against emergencies or disaster events.

4. In carrying out these responsibilities, I coordinate the activities of all agencies and organizations within the State of Louisiana and maintain liaisons with agencies and organizations of other states and of the federal government.

5. As GOHSEP Director, I am familiar with the various requirements for emergency preparedness and response in the State of Louisiana, including the existing Risk Management Program ("RMP") regulations of the United States Environmental Protection Agency ("EPA"), the emergency response preparedness requirements of the Emergency Planning and Community Right-to-Know Act ("EPCRA"), and state law equivalents.

6. I am also familiar with the recent amendments finalized by EPA in January 2017 to the RMP regulations ("RMP Amendments" or "the Amendments").

Statements Concerning the Adequacy of Protections Under Existing Requirements:

7. Existing law, exclusive of the RMP Amendments, provide an adequate framework for communication, coordination, and response to emergency situations—such as a chemical facility accidents—that threaten public safety.

8. I have overseen the implementation of these requirements during my tenure as GOHSEP Director and have observed them being effectively executed to protect the public in various types of emergency and disaster scenarios.

9. The RMP Amendments do not add significant protections for communities in the event of a chemical facility accident, above and beyond those currently in place.

10. Effective and efficient emergency response requires State and local response organizations to understand the incident command structure in place for various types of situations. This structure is a product of the myriad regulations, protocols, and procedures established at the federal, state, and local levels and of its implementation through practice and real events.

11. The additional mandates of the RMP Amendments will likely cause confusion for responders and planning organizations, as it is not clear how these mandates fit within the existing incident command structure prescribed under current law.

12. Further, the Amendments mandate new coordination and emergency response obligations that overlap with pre-existing similar requirements, in a manner that will drain state and local resources and potentially render emergency response organizations less effective than they are currently.

13. The RMP Amendments prescribe the public disclosure of sensitive chemical facility information in a manner that could allow wrongdoers to target and exploit and security vulnerabilities at the facility, harming the surrounding community.

14. The mandates are thus contrary to the primary objectives of the RMP program, namely to enhance the safety of covered facilities for the benefit of communities.

15. Response organizations engage in and coordinate regular exercises to enhance their preparation for various types of incidents, as no response protocol is effective until it is adequately practiced and understood by all involved.

16. It is therefore critical that existing command and response structures be considered in the development of rules and that any changes to regulations affecting emergency response and coordination requirements afford ample lead time before becoming effective, so that responders and planning organizations have the opportunity to familiarize themselves with new procedure and protocols.

17. Further, it is also critical that state and local emergency response and planning organizations be able to allocate resources in a manner that best serves the needs of communities, as they are in the best position to the determine needs of a particular locale.

18. The RMP Amendments, if allowed to take effect within the timeframes originally prescribed, would not only pose significant risks to the safety of the communities in the

vicinity of regulated facilities but would also burden state and local emergency response organizations, diminishing their ability to allocate scarce resources effectively.

19. A 20-month delay of effectiveness of the Amendments will allow EPA, as well as stakeholders such as GOHSEP, to carefully reconsider the impacts of the new requirements, including compatibility with existing similar requirements, the adequacy of available resources needed to implement the new mandates, and whether the information disclosure requirements in the Amendments risk harm to surrounding communities.

I certify under penalty of perjury that the foregoing is true and correct.

Dated this 20 day of December, 2017.

JAMES WASKOM
Director, Governor's Office of Homeland Security and Emergency Preparedness
State of Louisiana

Message

From:	Fotouhi, David [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=FEBAF0D56AAB43F8A9174B18218C1182-FOTOUHI, DA]
Sent:	2/8/2018 12:22:20 AM
To:	Brown, Byron [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9242d85c7df343d287659f840d730e65-Brown, Byro]
Subject:	FW: 17-6155 Tennessee Clean Water Network, et al v. TVA "amicus curiae brief"
Attachments:	38_AlabamaEtAlBrief.pdf; 45_3_ChamberEtAlBrief_WoutAddExs.pdf; 35_USWAGetalBrief_WoutAttachment.pdf; TVPPA Amicus Brief.pdf

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From: Ayliffe, David Demar [mailto:ddayliffe@tva.gov]
Sent: Wednesday, February 7, 2018 5:59 PM
To: Fotouhi, David <Fotouhi.David@epa.gov>
Subject: FW: 17-6155 Tennessee Clean Water Network, et al v. TVA "amicus curiae brief"

David – FYI. Attached are the amicus briefs filed in support of TVA's Sixth Circuit Appeal.

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Sent: Tuesday, February 06, 2018 5:10 PM
To: Ayliffe, David Demar
Subject: 17-6155 Tennessee Clean Water Network, et al v. TVA "amicus curiae brief"

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United States Court of Appeals for the Sixth Circuit

Notice of Docket Activity

The following transaction was filed on 02/06/2018

Case Name:	Tennessee Clean Water Network, et al v. TVA
Case Number:	17-6155
Document(s):	Document(s)

Docket Text:
AMICUS BRIEF filed by *Eric Michael Palmer for The State of Alabama, et al.*, federal/state government.. Certificate of Service:02/06/2018. [17-6155] (EMP)

Notice will be electronically mailed to:

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and its 4-OH metabolite in almonds, rice, wheat and meat, milk, poultry and eggs. Petition for tolerances'' (1984).

28. Office of Pesticides and Toxic Substances, Memorandum from David Ritter to H. Jacoby, ''EPA Reg.No 50534–7 Data Call in Submission. Chlorothalonil Registration Standard; review of data'' (1986).

29. Office of Prevention, Pesticides, and Toxic Substances, Memorandum from Alan C. Levy to Walter Waldrop/ Andrew W. Ertman, ''Chlorothalonil - Review of 30–Day, 90–Day and One–Year Dog Studies (Oral Administration, Gelatin Capsules)'' (1996).

30. Health Effects Division, U.S. EPA, Data Evaluation Report; Ninety Day Mouse Feeding Study; Technical Chlorothalonil (DS–2787) (1983).

31. Office of Prevention, Pesticides, and Toxic Substances, U.S. EPA, Memorandum from Alan C. Levy to Karen Whitby, ''Chlorothalonil - Rereview of a Chronic Dog Study and a Developmental Rat Study; Review of a Dermal Absorption Rat Study'' (1995).

32. Office of Pesticides and Toxic Substances, U.S. EPA, Memorandum from D. Ritter to Lois Rossi, ''EPA No 50534–7 - CX, Submission of additional toxicity data'' (1988).

33. Office of Prevention, Pesticides, and Toxic Substances, U.S. EPA, Health Effects Test Guidelines; OPPTS 870.3800; Reproduction and Fertility Effects (August 1998).

34. Health Effects Division, Office of Pesticide Programs, U.S. EPA, Data Evaluation Record (TXR No: 0052493): Reproduction and Fertility Effects Study - [rat]; Chlorothalonil (1995).

35. Office of Pesticide and Toxic Substances, U.S. EPA, Memorandum from Alan C. Levy to Walter Waldrop/ Andrew W. Ertman, ''Chlorothalonil - Two-Generation Reproduction Study in Rats'' (1993).

List of Subjects in 40 CFR Part 180

Environmental protection, Administrative practice and procedure, Agricultural commodities, Pesticides and pests, Reporting and recordkeeping requirements.

Dated: July 1, 2007.

Debra Edwards,

Director, Office of Pesticide Programs.

[FR Doc. E7–13830 Filed 7–17–07; 8:45 am]

BILLING CODE 6560–50–S

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 260 and 278

[EPA–HQ–RCRA–2006–0097; FRL–8326–1]

RIN 2050–AG27

Criteria for the Safe and Environmentally Protective Use of Granular Mine Tailings Known as ''Chat''

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: The Environmental Protection Agency (EPA or the Agency) is promulgating mandatory criteria for the environmentally protective use of chat in transportation projects carried out, in whole or in part, with Federal funds. Specifically, chat used in such transportation projects will be safe and environmentally protective if it is used in asphalt concrete, in slurry seals, microsurfacing, or in epoxy seals for anti-skid on bridge decking. Chat used in such transportation projects will also meet EPA's criteria if it is used in Portland cement concrete, flowable fill, stabilized base, chip seals, or as road base providing, on a case-by-case basis, either: Synthetic Precipitation Leaching Procedure (SPLP, EPA SW–846 Method 1312) tests are conducted on the proposed material and the leachate testing results show that concentrations in the leachate do not exceed the Drinking Water Standards for lead and cadmium and the fresh water chronic National Recommended Water Quality Criterion for zinc of 120 ug/l; or EPA (or a State environmental Agency, if it chooses to do so) has determined, based on a site-specific risk assessment and after notice and opportunity for public comment, that the releases from the chat mixture in its proposed use will not cause an exceedance of the National Primary Drinking Water Standards for lead and cadmium in potential drinking water sources and the fresh water chronic National Recommended Water Quality Criterion for zinc of 120 ug/l in surface water. Furthermore, this rule also establishes a criterion that other uses of chat will be safe and environmentally protective and are acceptable if they are part of, and otherwise authorized by, a State or Federal response action undertaken in accordance with Federal or State environmental laws, with consideration of a site-specific risk assessment. This rule does not require that chat be sized (dry or wet) prior to its use, as long as this rule's criteria are complied with. EPA is also establishing recommended criteria as guidance on the environmentally protective use of chat for non-transportation cement and concrete projects. Finally, the Agency is establishing certification and recordkeeping requirements for all chat, except that under the jurisdiction of the U.S. Department of Interior, Bureau of Indian Affairs (BIA). The chat covered by this rule is from the lead and zinc mining areas of Oklahoma, Kansas and Missouri, known as the Tri-State Mining District.

DATES: This final rule is effective on September 17, 2007.

The incorporation by reference of certain publications listed in this rule is approved by the Director of the Federal Register as of September 17, 2007.

ADDRESSES: The public docket for this final rule, Docket ID No EPA–HQ–RCRA–2006–0097, contains the information related to this rulemaking, including the response to comment document. All documents in the docket are listed in the *http://www.regulations.gov* index. Although listed in the index, some information may not be publicly available, *e.g.*, Confidential Business Information or other information the disclosure of which is restricted by statute. Certain other material, such as copyrighted material, will be publicly available only in hard copy. Publicly available docket materials are available either electronically in *http://www.regulations.gov* or in hard copy at the EPA Docket, EPA/DC, EPA West, Room 3334, 1301 Constitution Ave., NW., Washington, DC. The Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number of the Public Reading Room is 202–566–1744, and the telephone number to make an appointment to view the docket is 202–566–0276.

FOR FURTHER INFORMATION CONTACT: Stephen Hoffman, U.S. Environmental Protection Agency, 1200 Pennsylvania Avenue, NW, Washington, DC, 20460–0002, Mail Code 5306P; telephone number: 703–308–8413; fax number: 703–308–8686; e-mail address: *hoffman.stephen@epa.gov.* Additional information on this rulemaking is also available on the internet at *http://www.epa.gov/epaoswer/other/mining/chat/.*

The contents of this final rule are listed in the following outline

Contents of the Final Rule

I. General Information

A. Does This Rule Apply to Me?

These criteria affect the following entities: aggregate, asphalt, cement, and concrete facilities, likely limited to the Tri-State Mining District. However, other types of entities not identified could also be affected—that is, the list is not intended to be exhaustive, but to provide a guide for readers regarding those entities that potentially could be affected by this action. To determine whether your facility, company, business, organization, etc., is affected by this action, you should examine the applicability criteria of this preamble. If you have any questions regarding the applicability of this action to a particular entity, consult the person listed in the preceding **FOR FURTHER INFORMATION CONTACT** section.

B. What Are the Statutory Authorities for This Final Rule?

Through Title VI, Section 6018 of the Safe, Accountable, Flexible, and Efficient Transportation Equity Act of 2005 (HR 3 or "the Act"), Congress amended Subtitle F of the Solid Waste Disposal Act (42 U.S.C. 6961 *et seq.*) by adding Sec. 6006. This provision requires the Agency to establish safe and environmentally protective criteria (including an evaluation of whether to establish a numerical standard for concentrations of lead and other hazardous substances) for the use of granular mine tailings from the Tar Creek, Oklahoma Mining District, known as 'chat,' in cement and concrete projects and in transportation construction projects that are carried out, in whole or in part, using Federal funds. Section 6006(a)(4) requires that any use of the granular mine tailings in a transportation project that is carried out, in whole or in part, using Federal funds, meet EPA's established criteria.

In establishing such criteria, EPA is required to consider "the current and previous uses of granular mine tailings as an aggregate for asphalt, and any environmental and public health risks and benefits derived from the removal, transportation and use in transportation projects of granular mine tailings" carried out, in whole or in part, using Federal funds. EPA is also required to consult with the Secretary of Transportation, and other Federal agencies in developing these criteria. RCRA section 2002(a) grants the Agency broad rulemaking authority, providing that the Administrator is authorized to prescribe "such regulations as are necessary to carry out his functions under this chapter."

While this is a regulation promulgated under RCRA, the rule sets the criteria that must be complied with at transportation construction projects funded, in whole or in part, with Federal funds. The U.S. Department of Transportation (DOT) has statutory responsibility over the dispersement of federal funds for transportation projects. Therefore, USDOT will make reference to this rule as one of the regulatory requirements it requires all states to adhere to as a condition of receiving Federal funds for transportation projects using chat.

C. Definitions and Acronyms Used in the Rule

- *Asphalt*—also known as asphalt cement, is liquid bitumen (heavy petroleum) used as the binder in cold, warm, and hot mix asphalt, chip seals, slurry seals, and microsurfacing. The term 'asphalt' is sometimes used generically in place of cold, warm, or hot mix asphalt.
- *Asphalt concrete*—a layer, or combination of layers, composed of a compacted mixture of an asphalt binder and mineral aggregate.
- *Pozzolanic*—a siliceous material which when combined with calcium hydroxide in the presence of moisture exhibits cementitious properties.
- *State or Federal response action*—State or Federal response action undertaken pursuant to applicable Federal or State environmental laws and with consideration of site-specific risk assessments.
- *Raw chat*—unmodified lead-zinc ore milling waste that comes from the Tri-State Mining District.
- *Washed chat*—lead-zinc ore milling waste that has been wet-screened to remove the fine-grained fraction and which is sized so as not to pass through a number 40 sieve (0.425 mm opening size) or smaller.
- *Sized chat*—lead-zinc ore milling waste that has been wet-screened (washed) or dry sieved to remove the fine-grained fraction smaller than a number 40 sieve (0.425 mm opening size).

Non-transportation cement and concrete projects uses are:

—Construction uses of cement and concrete for non-residential structural uses limited to weight bearing purposes such as foundations, slabs, and concrete wall panels. Other uses include commercial/industrial parking and sidewalk areas. Uses do not include any residential use of cement or concrete (*e.g.*, residential parking areas, residential construction, concrete counter tops).

Transportation construction uses are:

—*Hot mix asphalt*—a hot mixture of asphalt binder and size-graded aggregate, which can be compacted into a uniform dense mass. Hot mix asphalt also includes hot mix asphalt sub bases and hot mix asphalt bases.

—*Portland cement concrete (PCC)*—pavements consisting of a PCC slab that is usually supported by a granular (made of compacted aggregate) or stabilized base and a sub base. In some cases, the PCC slab may be overlaid with a layer of hot mix asphalt. PCC uses also include bridge supports, bridge decking, abutments, highway sound barriers, jersey walls, and non-residential side walks adjacent to highways.

—*Flowable fill*—a cementitious slurry consisting of a mixture of fine

aggregate or filler, water, and cementitious materials which is used primarily as a backfill in lieu of compacted earth. This mixture is capable of filling all voids in irregular excavations, is self leveling, and hardens in a matter of a few hours without the need of compaction in layers. Most applications for flowable fill involve unconfined compressive strengths of 2.1 MPa (300 lb/in2) or less.

—*Stabilized base*—a class of paving materials that are mixtures of one or more sources of aggregate and cementitious materials blended with a sufficient amount of water that result in the mixture having a moist nonplastic consistency that can be compacted to form a dense mass and gain strength. This class of base and sub base materials excludes stabilization of soils or aggregates using asphalt concrete or emulsified asphalt.

—*Granular bases*—road base typically constructed by spreading aggregates in thin layers of 150 mm (6 inches) to 200 mm (8 inches) and compacting each layer by rolling over it with heavy compaction equipment. The aggregate base layers serve a variety of purposes, including reducing the stress applied to the sub grade layer and providing drainage for the pavement structure. The granular sub base forms the lowest (bottom) layer of the pavement structure and acts as the principal foundation for the subsequent road profile.

—*Embankment*—a volume of earthen material that is placed and compacted for the purpose of raising the grade of a roadway above the level of the existing surrounding ground surface.

—*Slurry seals*—a material composed of emulsified asphalt, aggregate, and mineral fillers, such as Portland cement or lime which is applied as a thin coating on top of asphalt or PCC road surfaces.

—*Micosurfacing*—polymer-modified slurry seal.

—*Cold mix asphalt*—an asphalt/aggregate mixture composed of binders, soaps, or other chemicals which allow its use when cold or warm.

—*Epoxy seals*—the mixture of aggregate in epoxy binders. Epoxy seals are typically used as an anti-skid surface on bridge decking.

—*Chip seals*—a material composed of aggregate placed on top of a layer of an asphalt or asphaltic liquid binder. The aggregate may be rolled into the binder.

Abbreviations and Acronyms Used in This Document

ANSI American National Standards Institute
AASHTO American Association of State Highway and Transportation Officials
ASR Alkali-Silica Reaction
ASTM American Society for Testing and Materials
ATSDR Agency for Toxic Substances and Disease Registry
BDAT Best Demonstrated Available Technology
BIA Bureau of Indian Affairs
CAA Clean Air Act (42 USCA 7401)
CERCLA Comprehensive Environmental Response Compensation and Liability Act (42 USCA 9601)
CFR Code of Federal Regulations
CWA Clean Water Act (33 USCA 1251)
DOT Department of Transportation
EO Executive Order
EPA Environmental Protection Agency
FHWA Federal Highway Administration
FR Federal Register
ICR Information Collection Request
IEUBK Integrated Exposure Uptake Biokinetic (Model)
MCL Maximum Contaminant Level (Safe Drinking Water Act)
NIOSH National Institute for Occupational Safety and Health
NPL National Priorities List
ODEQ Oklahoma Department of Environmental Quality
OMB Office of Management and Budget
OSHA Occupational Safety and Health Administration
OU University of Oklahoma
OUs Operable Units
PCC Portland cement concrete
PEL Permissible Exposure Level
ppmv parts per million by volume
ppmw parts per million by weight
Pub. L. Public Law
RCRA Resource Conservation and Recovery Act (42 USCA 6901)
ROD Record of Decision
SMCL Secondary Maximum Contaminant Level (Safe Drinking Water Act)
SPLP Synthetic Precipitation Leaching Procedure (EPA SW 846 Method 1312)
SSL (Superfund) Soil Screening Level
TCLP Toxicity Characteristic Leaching Procedure (EPA SW 846 Method 1311)
TWA Time-Weighted Average
USACE U.S. Army Corp of Engineers
U.S.C. United States Code

II. Summary of This Rule

On April 4, 2006, EPA published a **Federal Register** notice (64 FR 16729) seeking comment on a proposed rule that would establish criteria for the safe and environmentally protective use of chat in transportation projects funded, in whole or in part, with Federal funds, as well as proposed guidance on the use of chat in non-transportation cement and concrete projects. Based on a request to extend the comment period, the Agency again sought comment on this proposal on May 19, 2006 (71 FR 29117). The purpose of the proposed rule was to establish criteria that would identify environmentally protective uses of chat in federally funded transportation projects.

The Agency received many comments in response to its April 4 and May 19, 2006 notices. Numerous commenters generally supported the proposed rule, while other commenters suggested changes to the proposal. After considering all comments, we are finalizing the proposed rule with several significant modifications. The final rule, similar to the proposed rule, establishes criteria allowing the use of chat in federally funded transportation projects when used in asphalt concrete for roadway surfaces and in asphalt for road bases and sub bases. Upon consideration of the comments, the Agency is expanding its criteria for chat in federally funded transportation projects to include chat used in slurry seals, microsurfacing, epoxy seals, and cold and warm mix asphalt. However, a significant modification to the proposal is that before chat can be used in Portland cement concrete (PCC) federally funded transportation projects, a person must show, on a case by case basis that: (1) Synthetic Precipitation Leaching Procedure (SPLP, EPA SW–846 Method 1312) tests are conducted on the proposed material and the leachate testing results show that concentrations in the leachate do not exceed the National Primary Drinking Water Standards for lead and cadmium and the fresh water chronic National Recommended Water Quality Criterion for zinc of 120 ug/l; or (2) EPA (or a State environmental Agency, if it chooses to do so) has determined, based on a site-specific risk assessment and after notice and opportunity for public comment, that the releases from the chat mixture in its proposed use will not cause an exceedance of the National Primary Drinking Water Standards for lead and cadmium in potential drinking water sources and the fresh water chronic National Recommended Water Quality Criterion for zinc of 120 ug/l in surface water.

The Agency is making these changes in response to comments received on the proposed rule, including comments

from the Peer Review Panel, which argued that there were insufficient data for the Agency to determine the range of risk from the use of chat in PCC. In addition, based on comment, the Agency also concluded that the use of chat in flowable fill, stabilized based, chip seals and as road base may only be allowed if a case-by-case demonstration is made, as described above. This rule's approach will generate the data needed to determine if such uses are safe and environmentally protective. Such an approach is also similar to that already used by a number of states when they make beneficial use determinations.

The Agency wishes to emphasize that the use of chat in transportation projects, funded in whole or in part using Federal funds, does not affect a person's obligation to comply with existing state or Federal materials specifications. Further discussion of this matter is noted in the sections entitled, Physical and Chemical Characteristics of Chat and Relationship of this Rule to other Federal Regulations and Guidance.

The Agency has retained its proposal that chat authorized by a State or Federal response action undertaken in accordance with Federal or State environmental laws need not comply with the criteria in sections 278.3 (a) or (b). Such response actions are undertaken with consideration of site-specific risk assessments. For example, unencapsulated uses of chat may be authorized in a State or Federal remediation action. This rule also retains the certification requirement, since the Agency believes that such notice is important for states and the public to know how and where chat is used in transportation.

EPA believes that this rule will encourage the environmentally sound use of chat in transportation projects funded, in whole or in part, with Federal funds.

III. Background Information

1. What Is Chat?

Chat is the waste material that was generated from the extraction and beneficiation of lead/zinc minerals to produce lead/zinc concentrate in the Tri-State Mining District of Southwest Missouri, Southeast Kansas and Northeast Oklahoma. Chat is primarily composed of chert, a very hard rock. The primary properties that make chat useful in asphalt-based road materials, Portland cement concrete, and epoxies are grain size distribution, durability, non-polishing, and low moisture absorption.

In 1980, Congress enacted the Solid Waste Disposal Act Amendments (Pub. L. 96–482) which added section 3001(b)(3)(A)(ii) (the Bevill Amendment) to RCRA. This section required the Agency to study extraction/beneficiation wastes and in 1989 the Agency promulgated a rule (54 FR 36592) which exempts extraction/beneficiation wastes from regulation under the RCRA Subtitle C hazardous waste regulations (see (40 CFR 261.4(b)(7)). Therefore, chat is a "Bevill exempt" waste and is not subject to regulation under RCRA Subtitle C. This exemption does not, however, affect CERCLA jurisdiction over chat, since chat contains hazardous substances, nor does it affect the jurisdiction of RCRA section 7003, as long as the chat is a solid waste.

2. What Is the Areal Scope for This Action?

The Act directed EPA to develop criteria for chat from the Tar Creek, Oklahoma Mining District. However, there is no definition of the term "Tar Creek Oklahoma Mining District." Available literature references the "Tar Creek Superfund site," which is in Oklahoma, but the term "mining district" is only used in reference to the "Tri-State Mining District." For purposes of this final rule, the areal scope includes chat originating from the Tri-State Mining District of Ottawa County, Oklahoma, Cherokee County of southeast Kansas, and Jasper, Newton, Lawrence and Barry Counties of southwest Missouri, regardless of where it is used.

In 1979, the U.S. Bureau of Mines completed a study to identify all mined areas and mine-related hazards which confirmed that lead-zinc mining covers a portion of each of the States of Kansas, Missouri, and Oklahoma. This area is the same area known as the Tri-State Mining District.

Chat located in this historical mining district is a product of similar mineralization processes that sets it aside from related lead-zinc mineralization districts elsewhere in the United States. The Tri-State mineralization is specifically associated with wall rock alteration into dolomite and microcrystalline silica (chert). The term chat is derived from the word "chert," referring to the cherty wallrock found in this mining district. The lead/zinc ore and its related waste, chat, in this district also have a well defined lead to zinc ratio.

For over one hundred years of activity ending in 1970, the Tri-State Mining District has been the source of a major share of all the lead and zinc mined in the United States. Surface piles of chat, as well as underground mining areas, extend uninterrupted across the Oklahoma-Kansas State line. In the proposal, the Agency did not include Lawrence and Barry counties in southwest Missouri as part of the areal extent of the rule, but requested comment on whether it would be reasonable to include them (see 71 FR 16732). Commenters requested that the Agency expand the scope of the rule to include these two counties in southwest Missouri. Based on communication with state regulatory officials in Kansas, Missouri, and Oklahoma and review of mineral geology studies, EPA concludes that there is no real factual distinction between chat derived from these three states, and believes that it is reasonable to apply this rule to the areal extent of all chat generated and currently located in the following counties: Ottawa county, Oklahoma, Cherokee county, Kansas, and Newton, Jasper, Lawrence and Barry counties in Missouri.

3. Are There Any Current Regulations of Asphalt, Portland Cement Concrete or Chat Washing Facilities?

Based on the Agency's review of existing state and federal regulations, the Agency did not propose to apply any additional regulations on chat washing or hot mix asphalt and Portland cement concrete plants, although the Agency solicited comment on whether it would be prudent for this rule to apply additional controls, over those that currently exist, to address environmental releases from these types of facilities.[1] Specifically, at proposal, the Agency assessed existing regulations in Oklahoma, Kansas, and Missouri for hot mix asphalt plants and Portland cement concrete plants to determine whether those operations are appropriately regulated to address environmental releases for such facilities. (See memorandum entitled: *Evaluation of State Regulations* in the docket.) Those regulations set standards for point and fugitive air emission sources (see Kansas: K.A.R. 28–19–500, Missouri: 10 CSR 10–6.170, and Oklahoma: OAC 252:100–7/8/29) and also set requirements for water discharges from point source discharges (see Kansas: K.A.R. 28–16, Missouri: 10

[1] It should be noted that the statute does not require the Agency to set criteria for facilities that prepare chat prior to its use, but restricts the activities for which the Agency is to establish criteria for the use of chat in transportation projects funded, wholly or in part, with Federal funds. Nevertheless, the Agency evaluated the potential for environmental releases from these types of facilities—chat washing, hot mix asphalt and Portland cement concrete plants as part of the rulemaking.

CSR 20–6.200, and Oklahoma: OAC 252:606–5–5). In addition, Oklahoma, Missouri and Kansas all require that trucks transporting aggregate must be covered to reduce fugitive emissions and reduce damage to other vehicles from windblown debris. The Bureau of Indian Affairs (BIA) also requires that trucks transporting chat from Tribal lands be covered to prevent blowing dust from transport.

The Agency also assessed existing regulations in Oklahoma, Kansas, and Missouri for chat washing facilities to determine whether chat ''washing'' operations are adequately managed.[2] There are two commercial chat washing facilities in the Tri-State area and both are located within the Tar Creek Superfund site. While the States do not have specific regulations applicable to chat washing facilities, these facilities are subject to State general fugitive air emissions and general storm water discharge regulations. These general State permits require that fugitive dusts and runoff be controlled in a fashion so that dusts and other pollutants do not leave the property line or the boundary of the construction activity. In addition, because the two chat washing facilities are located within the Tar Creek Superfund site, the Agency may rely on CERCLA authority to establish any additional conditions that are considered necessary to be safe and environmentally protective.

The BIA is also establishing air and water standards for chat washing facilities located on Tribal lands and lands administered by BIA. BIA's requirements include that the chat washing facility manage waste water discharges so that they do not exceed State standards, that fugitive dusts be controlled, and that fines are handled and disposed of so that they do not contaminate ground water. In addition, BIA requires all purchasers of chat from Tribal lands, or lands administered by BIA, to certify that the chat will be used in accordance with authorized uses set forth in EPA fact sheets and other guidance. (See report titled, *Chat Sales Treatability Study Workplan for the Sale of Indian-Owned Chat within the Tar Creek Superfund Site, Ottawa County, Oklahoma,* June 23, 2005.).

A number of commenters noted their concern that existing regulations do not adequately control releases from these types of facilities. As noted above, the Agency reviewed existing state and Federal regulations of these facilities, and determined that they are in fact subject to regulation of their releases and that the existing regulations assure safe and environmentally protective conditions at these facilities—that is, hot mix asphalt plants, PCC plants and chat washing facilities. Therefore, the Agency is not promulgating additional controls for these facilities.

4. Are There Existing Criteria for the Use of Chat?

As noted in a 2005 University of Oklahoma (OU) report, the Oklahoma Department of Environmental Quality (ODEQ) has determined that the following transportation uses of raw chat are inappropriate: Use in residential driveways and as gravel or unencapsulated surface material in parking lots, alleyways, or roadways (See *A Laboratory Study to Optimize the Use of Raw Chat in Hot Mix Asphalt for Pavement Application: Final Report*). ODEQ also identified the following non-transportation uses of raw chat that are deemed inappropriate for residential use:

—Fill material in yards, playgrounds, parks, and ball fields
—Playground sand or surface material in play areas
—Vegetable gardening in locations with contaminated chat
—Surface material for vehicular traffic (e.g., roadways, alleyways, driveways, or parking lots)
—Sanding of icy roads
—Sandblasting with sand from tailings ponds or other chat sources
—Bedding material under a slab in a building that has underfloor air conditioning or heating ducts
—Development of land for residential use (*e.g.*, for houses or for children's play areas, such as parks or playgrounds) where visible chat is present or where the lead concentration in the soil is equal to or greater than 500 mg/kg unless the direct human contact health threat is eliminated by engineering controls (*e.g.*, removing the contaminated soil or capping the contaminated soil with at least 18 inches of clean soil)

EPA Region 6 also issued a Tar Creek Mining Waste Fact Sheet on June 28, 2002 that identified the following as acceptable uses of chat: (1) Applications that bind (encapsulate) the chat into a durable product (*e.g.*, concrete and asphalt), (2) applications that use the chat as a material for manufacturing a safe product where all waste byproducts are properly disposed, and (3) applications that use the chat as sub-grade or base material for highways (concrete and asphalt) designed and constructed to sustain heavy vehicular traffic. This fact sheet also incorporated the ODEQ list of unacceptable residential uses of chat.

In addition, EPA Region 7 issued a Mine Waste Fact Sheet in 2003 that identified the uses of chat that are not likely to present a threat to human health or the environment. Those uses are: (1) Applications that bind material into a durable product; these would include its use as an aggregate in batch plants preparing asphalt and concrete, (2) applications below paving on asphalt or concrete roads and parking lots, (3) applications that cover the material with clean material, particularly in areas that are not likely to ever be used for residential or public area development, and (4) applications that use the material as a raw product for manufacturing a safe product. The fact sheet also lists mine waste (chat) uses that may not be safe and environmentally protective and are similar to those listed by ODEQ and the Region 6 fact sheet. However, the Region 7 fact sheet also lists use as an agricultural soil amendment to adjust soil alkalinity as a use that may not be safe and environmentally protective.

This rule is more restrictive than the 2002/2003 Region 6 and 7 fact sheets. Therefore, the Agency is issuing new fact sheets on the use of chat from the Tri State Mining District in transportation construction projects funded, in whole or in part, with Federal funds and in non-transportation non-residential uses of chat. The new fact sheets are consistent with this rule. The fact sheets are available at *http://www.epa.gov/epaoswer/other/mining/chat/*.

5. Physical and Chemical Characteristics of Chat

This section provides information on the physical characteristics, such as hardness, soundness (durability), gradation, shape and surface texture, and chemical characteristics, such as the leaching potential of chat.

Physical Characteristics

In an OU study (*A Laboratory Study to Optimize the Use of Raw Chat in Hot Mix Asphalt for Pavement Application: Final Report (August 2005)*), the specific gravity of the raw chat was found to be 2.67, which is similar to some commonly used aggregates, such as limestone and sandstone.

According to an ODEQ study (*Summary of Washed and Unwashed Mining Tailings (Chat) from Two Piles at the Tar Creek Superfund Site, Ottawa County Oklahoma, Revised June 2003*), chat consists of materials ranging in diameter from 15.875 mm (5/8 inch) to

[2] While EPA recognizes that some chat is washed or sized prior to being used, today's final rule does not require that chat be washed prior to its use. Therefore, imposing additional requirements for chat washing facilities would seem inappropriate.

less than 0.075 mm (the size fraction that passes the No. 200 sieve).

Since raw chat is a crushed material from mining operations, raw chat particles have fractured faces. Raw chat also has numerous inter-granular voids in the loose aggregate form. The more angular the aggregate the higher the amount of voids. The uncompacted void content or the fine aggregate angularity of raw chat was found to be 46%. This value exceeds the higher fine aggregate angularity required by most State DOTs.

Raw chat is harder than some other aggregates, such as limestone. The L.A. abrasion value (determined by the Test for Resistance to Degradation of Aggregate by Abrasion and Impact in the Los Angeles Abrasion Machine) of raw chat was found to be 18% which is lower than that of limestone (23%) used in the OU study. This makes chat a good material in road surfaces since it does not wear down as fast as other aggregates.

Cubical shape is another desirable property of a good aggregate. The coarse aggregate in raw chat (particles retained on a 4.75 mm (#4) sieve) has less than 5% flat or elongated particles. Therefore, chat is viewed as a desirable aggregate material.

State DOTs specify minimum aggregate durability indices depending on the type of road surface. In the OU study, the aggregate durability index of raw chat was found to be 78%. The insoluble residue of raw chat was found to be 98%. Oklahoma DOT has established a 40% insoluble requirement for combined aggregates used in a surface layer of hot mix asphalt, for the purpose of skid resistance. Surface treatments, like microsurfacing, have higher insoluble residue requirements. Thus, the use of insoluble aggregates like chat in hot mix asphalt surface mixes and other surface treatments can improve the skid resistance and safety of pavements.

State DOTs also specify aggregate requirements for hot mix asphalt and PCC. Most State DOTs, including Kansas, Oklahoma and Missouri, have adopted aggregate standards developed by the American Association of State Highway and Transportation Officials (AASHTO). According to AASHTO, the 0.075 mm (#200) sieve size is the dividing line between sand-size particles and the finer sized particles defined as silts and clays. These finer particles often adhere to larger sand and gravel particles and can adversely affect the quality of hot mix asphalt and Portland cement concrete. The AASHTO standards for Fine Aggregate for Bituminous Paving Mixtures (M 29–03) and Fine Aggregate for PCC (M 6–03) specify limits for the amount of aggregate, on a percent mass basis, in hot mix asphalt and Portland cement concrete according to aggregate size and gradation. The aggregate sizes included in the AASHTO standards range from .075 mm to 9.5 mm which is within the range of particles found in raw chat. The AASHTO standards do not preclude the use of fine chat particles in hot mix asphalt or PCC. Depending on the designated grading, however, AASHTO limits particles finer than sieve size #50 in the range of 7% to 60% for aggregate in asphalt. Fine aggregate for use in concrete is limited by the States of Oklahoma and Missouri to between 5% and 30% for particles less than sieve size #50, while the corresponding values in Kansas are 7% to 30%. Therefore, chat used in asphalt or PCC must meet sizing specifications. This can be accomplished either by the raw chat meeting these specifications as is, or mixing the raw chat with other aggregates, by dry sizing, or by washing (wet sizing) the chat.

Current law requires that the chat used as an aggregate in transportation projects meet existing State Department of Transportation or Federal Highway Administration material specifications, which assure that the road surface, composed of hot, warm or cold mix asphalt, concrete or epoxy, is durable and will not degrade prematurely. As discussed below, in light of these existing requirements, EPA concluded that it was not necessary to establish any additional material specifications for the use of chat as an aggregate in federally funded transportation projects to ensure that when chat is used, it will be safe and environmentally protective.

Chemical Characteristics

Dames and Moore, 1993 and 1995; *Sampling and Metal Analysis of Chat Piles in the Tar Creek Superfund sites* for the Oklahoma Department of Environmental Quality, 2002, and Datin and Cates; *Summary of Washed and Unwashed Mining Tailings (Chat) from Two Piles at the Tar Creek Superfund Site*, Ottawa County Oklahoma, Revised June 2003, provide data on metals concentrations in washed and unwashed (or raw) chat. The Dames and Moore study indicated that total lead concentrations in the raw chat ranged from 100 mg/kg to 1,660 mg/kg, while the Datin and Cates study noted that mean total lead concentrations from the raw chat piles located throughout the Tri-State area ranged between 476 to 971 mg/kg. The AATA International, Inc. December 2005; *Draft: Remedial Investigation Report for Tar Creek OU4 RI/FS Program* found that the concentration of lead in the raw chat ranged from 210 mg/kg to 4,980 mg/kg, with an average of 1,461 mg/kg; cadmium ranged from 43.1 mg/kg to 199.0 mg/kg, with an average of 94.0 mg/kg; and zinc ranged from 10,200 mg/kg to 40,300 mg/kg, with an average of 23,790 mg/kg.

These studies show that as chat sizes become smaller, their metals content increases. The cited Datin and Cates report, *Summary of Washed and Unwashed Mining Tailings (Chat) from Two Piles at the Tar Creek Superfund Site, Ottawa County Oklahoma*, Revised June 2003, shows that total metals testing of wet screened material (larger fractions) resulting from chat washing have lead concentrations which range from 116 to 642 mg/kg, a range much lower than raw chat. Therefore, the data show that chat washing generates chat aggregate (greater than sieve size #40) with considerably lower metals concentrations than raw chat.[3]

6. What Are the Environmental and Health Effects Associated With Pollutants Released From Raw Chat?

The Tri-State Mining District includes four National Priorities List (NPL) Superfund sites that became contaminated from the mining, milling, smelting, and transportation of ore and the management practices for chat. These sites are located in Tar Creek in Ottawa County, Oklahoma, Cherokee County in southeast Kansas, and in Jasper and Newton Counties in southwest Missouri. Superfund cleanup activities related to the millions of tons of mining waste that were deposited on the surface of the ground at these sites have been designated as Operable Units (OUs). OUs are groupings of individual waste units at NPL sites based primarily on geographic areas and common waste sources.

Certain uses of raw chat have caused threats to human health and the environment as a result of the concentrations of lead, cadmium and zinc present in the chat.[4] Evaluation of

[3] The Datin and Cates report also provides TCLP testing data that indicates the dry sieve sizes greater than #40 would not exceed 5 mg/l, as well as data on wet screened material (larger fractions) that also shows that the leaching potential of this material is below 5 mg/l (1.028 to 3.938 mg/l). 5 mg/l is the level of lead that defines whether a waste is hazardous under RCRA subtitle C. Thus, this is another indication that the larger sizes of chat have lower lead concentrations than do smaller sized chat particles. (Note: As indicated earlier, chat is considered a Bevill mining waste and is thus, exempt from regulation under RCRA Subtitle C. However, we are using the TCLP leachate value for lead simply as a comparative measure to evaluate the leaching characteristics of chat.)

[4] Information regarding the specific threats to human health from lead, cadmium and zinc can be

raw chat also indicates that this waste in most unencapsulated uses has the potential to leach lead into the environment at levels which may cause threats to humans (*i.e.* elevated blood lead concentrations in area children). Such threats have been fully documented in Records of Decision (RODs) for the OUs at these NPL sites (See Tri-State Mining District RODs in the docket to this action). Copies of Site Profiles and RODs can be searched at: *http://www.epa.gov/superfund/sites/rods/index.htm*.

IV. Rationale for This Rule and Response to Comments

A. What Was the Process EPA Used to Develop This Action?

In developing the proposed rule, the Agency initially reviewed information concerning the environmental effects of the improper placement and disposal of chat found in the RODs cited above for the four NPL sites located in the Tri-State Mining District (Tar Creek, Jasper County, Cherokee County, Newton County). The Agency then reviewed reports which identified current or past uses of chat, primarily studies prepared to support Oklahoma Governor Keating's Taskforce (Governor Frank Keating's Tar Creek Superfund Task Force, *Chat Usage Subcommittee Final Report*, September 2000) and research on chat uses conducted by OU (*A Laboratory Study to Optimize the Use of Raw Chat in Hot Mix Asphalt for Pavement Application: Final Report August 2005*), as well as interviewed the principal authors of the OU studies to further evaluate their findings. Additionally, the Agency interviewed representatives from the Departments of Transportation in Oklahoma, Kansas, and Missouri and met with the U.S. Department of Transportation, Federal Highway Administration to discuss the use of aggregate substitutes in road surfaces and relied on the joint EPA/FHWA document of the use of wastes in highway construction [*User Guidelines for Waste and Byproduct Material in Pavement Construction*, FHWA, 1997 (*http://www.rmrc.unh.edu/Partners/UserGuide/begin.htm*)]. Furthermore, EPA met with the BIA to discuss BIA requirements for the sale of chat on Tribal lands. The Agency also conducted a series of interviews with the environmental regulatory agencies in the three involved States to further identify acceptable versus unacceptable uses of chat. Moreover, the Agency conducted interviews with companies which either used chat at that time or had used chat previously. As part of this effort, EPA representatives visited the Tri-State area to observe the condition of chat piles and confirm the location of chat washing and asphalt companies in the area. Finally, the Agency has communicated with the tribal members in the Tri-State area to inform them about this action and seek information about current uses.

Based on our review of the reports and interviews noted above, the Agency published a Proposed Rule on April 4, 2006, in which we specifically solicited comment on a number of issues (see 64 FR 16729). The Agency received approximately 20 comments on the proposal. The Agency's response to the comments received can be found in the docket for this rule (see Response to Comments Document). In addition, the Agency conducted an external Peer Review of the risk screen conducted for the proposal. The Peer Review Panel submitted comments to the Agency and based on those comments, the Agency conducted an additional risk screen of chat dusts from milling of road surfaces containing chat to determine if such an activity presented a risk to human health and the environment. Both the original risk screen and subsequent risk evaluations are noted in the risk section of the preamble to this final rule, and are also in the Docket to this final rule. The Agency also met with representatives from the Department of Transportation to seek their input on a number of issues raised by commenters. Finally, the Agency consulted with the Tribal interests to assure that their comments were fully understood by the Agency. Based on the additional work noted above, as well as responding to comments, the Agency is today finalizing the chat rule.

B. What Criteria Are EPA Establishing for the Use of Chat?

1. Transportation Construction Uses

Transportation construction uses of chat addressed in this final rule are those construction activities that occur as part of transportation construction projects that are funded, wholly or in part, with Federal funds. The Agency has evaluated all the transportation construction uses and has concluded that chat used in hot, warm, or cold mix asphalt, slurry seals, microsurfacing and in epoxy seals, or other uses of chat that are evaluated on a case-by-case basis will be safe and environmentally protective.

a. What Is the Final Action?

This final rule establishes criteria that chat used in transportation construction projects that are funded, wholly or in part, with Federal funds, must meet as a condition of receiving Federal transportation funding. Specifically, those criteria define the following uses to meet the statutory standards: chat that is used in asphalt concrete, slurry seals, microsurfacing, or epoxy seals. The use of chat also meets EPA's criteria if it is used in PCC, stabilized road base, granular road base, flowable fill, and in chip seals, provided that on a case-by-case basis: (1) Synthetic Precipitation Leaching Procedure (SPLP, EPA SW–846 Method 1312) tests are conducted on the proposed material and the leachate testing results show that concentrations in the leachate do not exceed the National Primary Drinking Water Standards for lead and cadmium and the fresh water chronic National Recommended Water Quality Criterion for zinc of 120 ug/l; or (2) EPA (or a State environmental Agency, if it chooses to do so) has determined, based on a site-specific risk assessment and after notice and opportunity for public comment, that the releases from the chat mixture in its proposed use will not cause an exceedance of the National Primary Drinking Water Standards for lead and cadmium in potential drinking water sources and the fresh water chronic National Recommended Water Quality Criterion for zinc of 120 ug/l in surface water.

EPA has also established a criterion that other chat uses will be safe and environmentally protective if they are part of, and otherwise authorized by a State or Federal response action undertaken in accordance with Federal or State environmental laws. Such response actions are undertaken with consideration of site specific risk assessments.

In addition, for all chat used in transportation construction projects that are funded, in whole or in part, using Federal funds that is not subject to the BIA Chat Use Certification requirements described in Section IV.B1, the Agency is establishing a certification requirement similar to that required by BIA. Specifically, any acquirer of the chat must submit a signed, written certification that the chat will be used in accordance with EPA's criteria. The certification will also include the location of origin of the chat and the amount of chat acquired.

The certification must be provided to the environmental regulatory agency in the State where the chat is used, except for chat acquired on lands administered

found in the *Agency for Toxic Substances and Disease Registry (ATSDR) Fact Sheet for Lead*, September 2005, the *ASTDR Fact Sheet for Cadmium*, June 1999 and the *ATSDR Fact Sheet for Zinc*, September 1995, all of which are available in the Docket to today's final rule.

by the BIA which is subject to the BIA certification requirements. The Agency is also requiring that if the acquirer sells or otherwise transfers the chat, the new owner of the chat must also submit a signed, written certification as described in this section. Most commenters did not support the certification requirement, because they believe that it would increase the cost of using chat. As noted earlier, BIA has established a chat sales program affecting chat sales from tribal lands. That program includes a certification requirement similar to that found in this rule. The Agency believes that certification is necessary to assure that chat users comply with today's criteria, as well as serving as a means to inform State environmental agencies about the use of chat in their state. The Agency has reviewed the burden on industry to fill out and maintain the certification records and does not find that such a requirement is burdensome. Moreover, the Agency believes that the certification requirement will provide important information to state environmental agencies to ensure that the chat is used as required under this rule.

This rule also requires that chat users maintain records. The Agency is requiring that the acquirer, or any other person that receives a copy of the certification, maintain a copy of the certification in its files for three years following transmittal to the State environmental regulatory agency. If the use is based on a case-by-case basis, the acquirer must maintain copies of any SPLP leachate testing results or any site-specific risk assessment for three years.

b. What is the rationale for the Rule?

The Agency is basing this action on our review of various studies and data that show that certain uses of chat are safe and environmentally protective.

i. Hot Mix Asphalt

There are a number of factors which lead us to conclude that chat used in hot mix asphalt is safe and environmentally protective:

Several studies have been conducted on the use of chat in hot mix asphalt. The most comprehensive study was conducted by the OU School of Civil Engineering and Environmental Science. OU published their findings in a report titled, *A Laboratory Study to Optimize the Use of Raw Chat in Hot Mix Asphalt for Pavement Application: Final Report* (August 2005). OU tested the durability and leaching potential of a variety of mixtures of hot mix asphalt with raw chat for road surfaces and for road bases. In addition, OU milled (sawed) samples to simulate weathering. The Agency relied on these findings as one of the principal sources of data supporting the use of chat in hot mix asphalt road surfaces and asphalt road bases. The OU study also confirms the findings of an earlier study conducted by the U.S. Army Corp of Engineers (*Tar Creek Superfund Site, Ottawa County, Oklahoma, Final Summary Report: Chat—Asphalt Paved Road Study* USACE—Tulsa District, February 2000). Specifically:

- Comparison of the Synthetic Precipitation Leaching Procedure (SPLP) results of milled (weathered) chat asphalt samples in the OU study with the National Primary and Secondary Drinking Water Standards (*www.epa.gov/safewater/mcl.html*), without dilution and attenuation, show that milled surface and road base mixtures did not exceed the primary drinking water standard for lead [5] (0.015 mg/l) or cadmium (0.005 mg/l). The OU results also show that milled asphalt road bases and surfaces did not exceed the secondary drinking water standard for zinc (5 mg/l).[6]
- The TCLP test was designed as a screening test to simulate leaching of materials in a municipal solid waste landfill. The SPLP test is also a screening test to simulate leaching of materials when exposed to acid rain. It is highly unlikely that road surfaces would be exposed to leaching conditions found in municipal solid waste landfills. Therefore, the Agency believes that of these two tests, the SPLP tests are likely to better mimic the leaching potential of such mixtures when they are to be used in road construction.
- The OU study tested unweathered and milled samples. The Agency believes milled samples represent worst case scenarios because milling exposes more surface area to leaching.
- In a dissertation submitted to the University of New Hampshire titled, *Contributions to Predicting Contaminant Leaching from Secondary Material Used in Roads,* Defne S. Apul, September 2004, the author noted that if pavement is built on highly adsorbing soils, the concentrations of leached contaminants reaching groundwater are more than several orders of magnitude lower than the MCLs.

The ODEQ report entitled, *Summary of Washed and Unwashed Mining Tailings (Chat) from Two Piles at the Tar Creek Superfund Site, Ottawa County Oklahoma,* Revised June 2003, also evaluated leachate from asphalt containing chat removed from the Will Rogers Turnpike located near Quapaw, Oklahoma. This evaluation was conducted to determine if asphalt concrete containing chat that is removed at the end of its useful life poses contamination threats from metals leaching into the environment. TCLP results for lead ranged from less than 0.050 mg/l to 0.221 mg/l. There are no SPLP test data in this report. However, based on best professional judgment and review of TCLP versus SPLP results, EPA believes that if SPLP tests were conducted, there would be a reduction in lead concentrations of approximately one order of magnitude as compared to the results of TCLP tests. Therefore, we believe that SPLP results would not exceed the MCL for lead. Based on these results, EPA does not believe the disposal of chat asphalt should present risks to the environment. The Agency sought comment on whether data was available which would further clarify whether the leachate potential from end of life use of chat in asphalt presented any threats. The Agency did not receive any comments or information that disproves the Agency's contention that it is unlikely that end of life chat asphalt will adversely affect the environment.

Finally, the Peer Review Panel that reviewed and commented on the risk screen for the proposed rule concluded that the use of chat in hot mix asphalt road surfaces and in asphalt road bases are safe and environmentally protective. The Agency, therefore, concludes that the use of chat in hot mix asphalt for pavement (which accounts for about 95% of the current chat usage), asphalt base, and asphalt sub base are safe and environmentally protective. EPA does not believe that it is necessary to establish specifications of what constitutes "hot mix asphalt" because transportation construction uses are required to comply with Federal and State Department of Transportation material specifications. These specifications delineate requirements which ensure that when chat is used in hot mix asphalt, the resulting product will be structurally stable. It is

[5] The National Primary Drinking Water Regulations set a Maximum Contaminant Level Goal of zero and a Treatment Technique action level of 0.015mg/l for lead.

[6] Several hot mix asphalt samples were also tested in the OU study using the Toxicity Characteristic Leaching Procedure (TCLP). For surface samples, TCLP average concentrations for lead ranged from <0.005 mg/l to a high of 0.46 mg/l. TCLP average concentrations for cadmium ranged from <0.010 mg/l to 0.223 mg/l and zinc concentration averages ranged from 11.3 mg/l to 28.53 mg/l. Road base samples usually have higher metals concentrations than do surface samples. For road base samples, average TCLP lead concentrations ranged from 0.069 mg/l to 2.008 mg/l, while average TCLP cadmium concentrations ranged from 0.011 mg/l to 0.087 mg/l and average TCLP zinc concentrations ranged from 19.9 mg/l to 41.33 mg/l.

recommended that chat users first determine if the proposed use meets State or Federal DOT materials specifications, since adherence to them is separately required under current law.

ii. Slurry Seal, Microsurfacing, Warm Mix Asphalt, Cold Mix Asphalt, and Epoxy Seal

While the proposal limited the use of chat as a direct ingredient in hot mix asphalt (including use as road pavement, asphalt base and asphalt sub base), many commenters requested that the Agency expand the scope of the criterion to include other road surface uses associated with asphalt that they believed retard the leaching of metals in chat in the same manner as does hot mix asphalt, including slurry seals, microsurfacing, cold mix asphalt, epoxy seals and chip seals. Commenters did not provide data to support their assertions. The Agency reviewed published information regarding the binding and durability characteristics of these uses and found that, except for chip seals, they would retard the leaching of metals in the same manner as hot mix asphalt. To further confirm this information, we met with Department of Transportation officials to determine which of these applications, if any, do in fact encapsulate chat similarly to hot mix asphalt. Based on those discussions and our review of published information, the Agency's criteria includes the use of chat in slurry seals, microsurfacing, warm mix asphalt, cold mix asphalt, and epoxy seals as safe and environmentally protective in transportation construction projects that are carried out in whole, or in part, using Federal funds, but does not include the use of chat in chip seals. Specifically:

- Slurry seals and microsurfacing involve the application of a mixture of asphalt, chemical binders, petroleum liquids and aggregate on the top surface of roads. This "resurfacing" meets a number of needs, including repairing fine fractures in the road surface, extending the life of the road, and improving skid resistance. EPA reviewed literature on these uses and found that these uses have the same engineering characteristics as hot mix asphalt. EPA also met with the FHWA, U.S. DOT to determine if microsurfacing and slurry seals retard the leaching of metals in the same manner as hot mix asphalt. FHWA indicated that slurry seals and microsurfacing would bind metals in the same manner as hot mix asphalt and would result in similar leaching results. Based on this conclusion and our review of the literature, the Agency today views the use of chat in slurry seals and microsurfacing as safe and environmentally protective.
- As part of EPA's discussions with FHWA, we also discussed the ability of warm mix asphalt and cold mix asphalt to encapsulate and bind chat. Warm mix asphalt is a combination of asphalt, asphalt emulsions, paraffin or esterfied wax, and mineral additives that allow the materials to be worked at temperatures much lower than hot mix asphalt. Cold mix asphalt is a combination of asphalt, petroleum liquids, soaps, and other chemicals which allow the materials to be worked with when cold. FHWA confirmed that warm and cold mix asphalt would encapsulate chat in the same manner as hot mix asphalt, and thus, would likely result in similar leaching results. Based on Agency conversations with FHWA and our review of the literature, the Agency also views the use of chat in warm and cold mix asphalt as safe and environmentally protective.
- EPA also discussed the use of epoxy binders on bridge decks with FHWA. Commenters and one of the chat washing companies noted that some chat is sold to companies which mix chat with epoxy binders for use as an anti-skid coating for highway bridges. EPA evaluated the engineering durability of these epoxies and found that they are equal to or are more durable than asphalt. FHWA also confirmed that the use of epoxies would encapsulate chat equally to the binding found with asphalt, and thus, would result in similar leach results. Based on this conclusion, the Agency today views the use of chat in epoxy binders for anti-skid purposes as safe and environmentally protective.

In conclusion, the use of chat in hot mix asphalt, slurry seals, microsurfacing, warm mix asphalt, cold mix asphalt, or epoxy seals in transportation construction projects funded, in whole or in part, with Federal funds is safe and environmentally protective. Such uses do not require approval from EPA prior to their use, as long as certification and recordkeeping requirements are met.

iii. Concrete, Flowable Fill, Granular Road Base, Stabilized Road Base and Chip Seals and Conditions for Use

This rule regarding the use of chat in concrete pavement has changed from that presented in the April 2006 proposal and this rule sets additional requirements on chat used in PCC. In particular, the proposed rule allowed chat used as an aggregate in PCC without any testing or other requirements. The Agency proposed the use of chat in PCC based on the following data and information:

- An undated OU Surbec-Art Environmental study[7] and a 2000 OU study[8] conducted the only known assessments of total metals content and TCLP testing of concrete matrices mixed with raw chat. The 2000 OU results are also presented in the 2005 OU study. The results from those two studies are presented in the following Table:

	S1		S2		C40	
	Total (mg/kg)	TCLP (mg/l)	Total (mg/kg)	TCLP (mg/l)	Total (mg/kg)	TCLP (mg/l)
Lead	178	0.92	379	0.17	150	1
Cadmium	[R] 30	0.09	[R] 35	0.12	35	0.1
Zinc	4200	0.23	4400	0.16	4100	....

[R] rounded to nearest whole number.

- While not a direct measure of the leaching potential of chat contained in PCC, waste stabilization technologies and their effectiveness are well defined in the Agency's *Final Best Demonstrated Available Technology (BDAT) Background Document for Universal Standards, Volume A, July 1994 and Proposed Best Demonstrated Available Technology (BDAT) Background Document for Toxicity Characteristic Metal Wastes D004–D011,*

[7] *Preliminary Report on the Findings of Environmental and Engineering Tests Performed on Mine Residual Materials from Ottawa County, Oklahoma.*

[8] *Development of Holistic Remediation Alternatives for the Catholic 40 and Beaver Creek.*

July 1995. One of those technologies is stabilization or encapsulation of the waste in a cement matrix, to reduce the mobility of the metals in the waste. That is, the metals are chemically bound into a solid matrix that resists leaching when water or a mild acid comes into contact with the waste. The Agency evaluated contaminant levels in unstabilized versus stabilized wastes to determine the reduction in mobility of metals, including lead and cadmium, when those wastes were stabilized in a cement matrix. These results indicate that stabilization with cement generally reduced lead and cadmium mobility by two to three orders of magnitude (*see* Table A4 of the July 1994 document cited above).

However, the Peer Reviewers and commenters who reviewed and commented on the risk screen analyses to the proposed rule raised concerns with the lack of data presented on the stabilization of chat in concrete. Specifically, the Peer Reviewers indicated that there were only three samples analyzed and that given the limited data, it was not possible for them to determine if risks existed from the use of chat in concrete. While the Peer Reviewers noted that it was likely that the concrete bound the metals in a similar fashion as asphalt, they also did not believe there was enough data or information to reach a definitive conclusion.

Some commenters also argued with the lack of leaching data for chat in PCC and questioned whether the Agency has sufficient information to finalize the proposal. Other commenters also noted that there were significant differences between stabilizing high metal bearing wastes with cement and the mixing of chat into PCC pavement. Commenters indicated that from a risk standpoint, concrete road surfaces after aging contain fine surface fractures that would allow rain water to percolate through the surface into groundwater. The Agency acknowledges these differences.

Commenters also noted that it was unlikely that chat would be used in concrete pavement since it can be a poor performing aggregate when used in PCC due to potential alkali-silica reaction (ASR) and freeze/thaw durability issues. This is the reason that chat is not an approved PCC aggregate by Oklahoma DOT. At proposal, the Agency also evaluated highway design specifications; *i.e.*, layering of compacted material and the movement of water through concrete (hydraulic conductivity,[9]) and initially thought that such designs in general retard the movement of rainwater through concrete and into groundwater. Commenters questioned this conclusion. As a result, the Agency met with the FHWA to determine how extensively water flowed across and through concrete pavements. FHWA indicated that there is considerable water flow through concrete pavement either through flow out of the joints or cracks, or through flow from the shoulders downward into the base. Based on Agency discussions with FHWA, the Agency no longer believes that such designs in general retard the movement of rainwater through concrete.

Commenters also requested that the rule allow the use of chat in flowable fill. However, commenters did not provide information to support this request. While flowable fill involves the use of a pozzolanic material (cement), the ability of flowable fill to bind chat is unclear because flowable fill uses cement in amounts as little as 3 to 5 percent by weight. Therefore, the Agency does not have sufficient information to allow this use without additional information or setting additional conditions.

In addition, commenters requested that the rule allow the use of chat as granular road base. Such bases are typically constructed by spreading aggregates in thin layers and compacting each layer to reduce the stress applied to the sub grade layer and providing drainage for the pavement structure. The Agency acknowledges that some chat can meet state or Federal materials specifications for this use. These commenters did not, however, provide any information to support this request. As noted above, some washed chat has significantly lower lead concentrations than raw chat. However, as FHWA notes, highway designs retard some, but not all of the water flowing across and into ground water. Such water movement could leach metals from the chat road base into ground water. Because the Agency did not receive additional information on the leaching characteristics of this use, the Agency is unable to allow it without additional information or setting additional conditions.

Still other commenters requested that the rule allow the use of chat in stabilized base. Stabilized base uses chat mixed with cement or other pozzolanic materials to increase their bearing weights. This additional material should reduce the mobility of the metals. However, the stabilized road base may use cement or other materials in amounts corresponding to 4 to 6 percent by weight which is less than that used in PCC. The commenters did not provide information to support this request. While some binding of metals is likely to occur, the Agency does not have sufficient information to allow this use without additional information or setting additional conditions.

Finally, at proposal, the Agency did not include an evaluation of the use of chat in chip seals. Commenters requested that the rule allow the use of chat in chips seals. These commenters did not, however, provide information to support this request. Chip seals involve application of an asphalt liquid on top of an existing road surface. After the application of the asphalt liquid, an aggregate (such as chat) is placed on the asphalt liquid and may then be rolled into the liquid. It is possible that several applications can be applied. In some circumstances, the aggregate layer is coated with asphalt liquids. EPA met with the FHWA to determine if chip seals were generally viewed as being able to retard the leaching of metals in the same manner as hot mix asphalt. FHWA indicated that under most circumstances, asphalt used in chip seals did not always fully coat chat particles, and chat could be released into the environment. Given the concerns raised by FHWA and the lack of data on this use, the Agency concludes that it does not have sufficient information to allow the use of chat in chip seals without additional information or setting additional conditions.

A number of commenters also noted that some washed chat does not test hazardous under the TCLP and that restricting all uses of raw chat, or encapsulated uses where leach data are not available, was overly restrictive.[10] The Agency has reviewed the TCLP/SPLP test data of raw chat and recognizes that some washed chat has significantly lower lead and zinc concentrations than raw chat. Nevertheless, the Agency remains concerned that the use of raw chat or chat mixed with other materials could pose risks to human health and the environment, based on the physical and chemical characteristics of the material, as well as the history of its use.

[9] Acording to the Portland Cement Association, the hydraulic conductivity of a typical Portland cement concrete is 1×10^{-1}cm/sec.

[10] While the Agency is not requiring that chat be washed or dry sized prior to being used, the rules also do not prevent a person from washing or dry sizing chat before it is used either directly or in combination with another material.

After careful evaluation of the comments received and the report from the Peer Reviewers, the Agency believes that the limited amount of leaching data on chat used in PCC, flowable fill, granular road base, stabilized road base, and chip seals do not provide enough support to determine that these uses of chat will be safe and environmentally protective.

In the proposal, the Agency requested comment on whether there was a need for leachate testing of chat used in hot mix asphalt or in PCC (*see* 54 FR 16738). Most commenters noted that the use of chat in hot mix asphalt was protective and that a requirement of additional SPLP testing was not warranted, however, they did not provide information to support this position. Nevertheless, as already discussed, the Agency believes there are sufficient data, particularly that provided in the 2005 OU study, to support its finding that chat used in hot mix asphalt, as well as warm mix asphalt, cold mix asphalt, slurry seals, microsurfacing, and in epoxy seals will be safe and environmentally protective without the need for further leachate testing.

Other commenters, while they did not call for specific leachate testing of chat used in PCC, did raise concerns as to whether there were sufficient data to reach the conclusion that chat used in PCC or other uses was protective. The Agency agrees that insufficient data exist to conclude that the use of chat in PCC would be safe and protective. Therefore, the Agency has concluded that additional information, either through the use of SPLP testing or through a site-specific risk assessment, is necessary to be able to conclude that the use of chat in PCC, as well as flowable fill, granular road base, stabilized road base, and chip seals would meet the statutory standards. Specifically, EPA has established a criterion defining the use of chat in PCC, flowable fill, granular road base, stabilized road base, and chip seals as safe and environmentally protective if, on a case-by case basis, either: (1) Synthetic Precipitation Leaching Procedure (SPLP, EPA SW–846 Method 1312) tests are conducted on the proposed material and the leachate testing results show that concentrations in the leachate do not exceed the National Primary Drinking Water Standards for lead and cadmium and the fresh water chronic National Recommended Water Quality Criterion for zinc of 120 µg/l[11]; or (2) EPA (or a State environmental Agency, if it chooses to do so) has determined, based on a site-specific risk assessment and after notice and opportunity for public comment, that the releases from the chat mixture in its proposed use will not cause an exceedance of the National Primary Drinking Water Standards for lead and cadmium in potential drinking water sources and the fresh water chronic National Recommended Water Quality Criterion for zinc of 120 µg/l in surface water.

If a chat user chooses to conduct SPLP leachate testing and the results indicate that they do not exceed the standards noted above, the user does not need to submit the data to EPA (or a state, if it chooses to do so) for review and approval. However, the regulation requires that the user submit a certification statement to the environmental regulatory agency in the State where the chat is acquired and maintain copies of the SPLP testing results for a period of three years.

If a chat user chooses to prepare a site specific risk assessment, the assessment must be submitted to EPA, or the State environmental agency, at the State's option, prior to use. EPA or the State environmental agency will review the site-specific risk assessment and determine, after notice and comment, if the use is safe and environmentally protective (see Section iii c below). After EPA or the State makes its determination, the user will still be required to meet the certification and recordkeeping requirements described in Section IV. B. 1. of this final rule.

iv. Sizing of Chat Prior to Use

Finally, this final rule is not requiring that chat be sized before it is used because chat used in transportation construction projects must meet material specification standards established by either the State or Federal DOT. Those specifications set their own size standards which can be met in a variety of ways, such as by sizing chat or by blending chat with other sized aggregate. Since existing specifications address the sizing issue, this rule need not do so. However, some commenters recommended that the Agency allow any use of sized chat since it has lower lead concentrations than raw chat. Studies of the lead concentrations found in raw chat piles indicate that those concentrations vary from pile to pile. Data indicates that particles finer than sieve size #40 in raw chat tend to have a TCLP for lead of greater than 5 mg/l, while larger particles in the raw chat tend to have a TCLP for lead of less than 5 mg/l. While the Agency acknowledges these results, commenters did not provide information showing a lack of risks from other uses of washed chat not covered by this rule. As a result, the Agency is unable to allow these other uses unless the user can show the use is protective through a case-by-case demonstration as discussed previously.

v. Use of the SPLP Versus the TCLP

EPA developed the TCLP as a tool to predict the leaching potential of constituents from waste in a municipal solid waste landfill. The TCLP method is used to determine if a waste is hazardous under 40 CFR 261.24 (see the Toxicity Characteristic rule, 55 FR 46369; November 2, 1990). The TCLP is also used in listing hazardous wastes to estimate leachate concentrations for use in groundwater modeling (for example, see the petroleum listing, 63 FR 42110, August 6, 1998). The TCLP leaching solution contains acetic acid that is adjusted to a pH of 4.93 or 2.88, depending on the acidity of the waste sample.

On the other hand, EPA developed the SPLP as a method to predict the leaching from wastes or soils under exposure to the slightly acidic, dilute solution generated by normal rainfall. The SPLP test uses a leach solution which mimics acid rain, while the TCLP uses a leach solution which mimics acids formed in municipal landfills. In past actions, EPA has recognized that the TCLP's use of organic acids may not be appropriate for disposal scenarios that do not involve municipal landfills. For example, in the proposed rule for management and disposal of lead-based paint debris, EPA used the SPLP to assess leaching from landfills that do not accept municipal wastes (see 63 FR 70189; December 18, 1998). Similarly, EPA utilized the SPLP in screening low hazard wastes as part of its 1989 Bevill determination (see 54 FR 36592; September 1, 1989). The use of chat in transportation construction projects would preclude chat from being exposed to the conditions found in municipal landfills. Chat used in transportation construction projects will, however, be exposed to rainfall that then enters the groundwater.

In determining which leach test to require, the Agency believes that the SPLP is the more appropriate test. As stated previously, the TCLP was designed as a screening test to simulate the leaching potential of wastes in municipal solid waste landfills. Since it

[11] It should be noted that this case-by-case showing does not require public notice and comment.

is highly unlikely that road surfaces would be exposed to leaching conditions found in municipal landfills, and because the SPLP test is a more likely scenario that would simulate the leaching potential of metals in chat used in transportation construction projects, we are requiring that if chat is to be used in PCC, granular road base, flowable fill, stabilized road base or chip seals, the user make a case-by-case demonstration using the SPLP test.

vi. Rationale for Setting National Primary Drinking Water Standards Versus National Recommended Water Quality Criteria, and Dilution and Attenuation Factors (DAFs)

Because the Agency is requiring leachate testing if chat is to be used in PCC, granular road base, flowable fill, stabilized road base or chip seals, the Agency also must establish specific numeric criteria. In the proposal, the Agency requested comment on this issue. Specifically, the Agency stated, "For example, the Agency could specify that the results of testing would need to meet the Primary and Secondary Drinking Water Standards for lead, cadmium, and zinc. The Agency also solicits comment on whether the leachate should be measured against the National Recommended Water Quality Criteria which address acute and chronic biological effects." The Agency also requested comment on whether a Dilution and Attenuation Factor should be applied to reflect how contaminant concentrations may change as they move through the environment (see 64 FR 16738–39). The Agency received only one comment on this issue. The commenter suggested that SPLP results should be measured against state water quality standards for lead, cadmium and zinc, and the Agency should use the chronic criteria for protection of aquatic life.

The Agency disagrees with the commenter that we should use the State water quality criteria instead of the National Primary Drinking Water standards for lead and cadmium. State water quality criteria are established for the protection of aquatic life and human health in surface water for approximately 150 pollutants. National Primary Drinking Water standards protect public health by ensuring safe drinking water and protecting ground water. EPA has selected the National Primary Drinking Water standard for lead and cadmium since those standards are most protective of human health. The Agency has selected these standards for a variety of reasons. First, review of the Tar Creek Superfund site RODs indicated that one of the metals of concern is lead. The 2005 OU studies on the use of chat in asphalt also indicated that lead, cadmium and zinc are the principle heavy metals of concern in chat. Those conclusions are based on review of a series of studies which evaluated the metals concentrations in raw chat piles. They are also the criteria that EPA used in determining that chat used in hot mix asphalt is safe and environmentally protective.

RODs also show that runoff from chat piles may be adversely affecting biological resources in streams throughout the Tar Creek Superfund site. Agency review of the environmental impacts of zinc (see ATSDR report on zinc) confirms that it can adversely affect aquatic species. Since the Agency agrees with the commenter that aquatic life should be protected, the Agency has decided to use the freshwater chronic National Recommended Water Quality Criteria for zinc of 120 μg/l. It should be pointed out that there is no National Primary Drinking Water standard for zinc and that the National Secondary Drinking Water standard for zinc is a non-enforceable guideline regulating contaminants that may cause cosmetic effects or aesthetic effects in drinking water. The Agency believes it is more appropriate to use the National Recommended National Water Quality Criteria for zinc since it addresses aquatic toxicity, as opposed to the National Secondary Drinking Water standard which addresses cosmetic and aesthetic effects.

As noted above, other commenters stated that they did not believe leachate testing is necessary when chat is mixed with asphalt or concrete. They asserted that such uses were safe and environmentally protective. With respect to most uses of chat in asphalt; *i.e.*, hot mix asphalt, warm mix asphalt, cold mix asphalt, slurry seals, and microsurfacing, the Agency agrees with the commenters. However, as stated previously, there is insufficient data or evidence that other uses of chat; *e.g.*, in PCC, granular road base, flowable fill, stabilized road base or chip seals are safe and protective. This final rule allows these uses of chat in transportation construction projects if the user conducts SPLP testing and the leachate does not exceed the National Primary Drinking Water Standards for lead and cadmium and the freshwater chronic National Recommended Water Quality Criteria for zinc of 120 μg/l.

At proposal, the Agency also solicited comment on whether Dilution and Attenuation Factors (DAFs) should be applied to the leachate criteria if such criteria were established. The Agency received only one comment on this issue. The commenter suggested that to assess surface water quality, a DAF of 100 times the Water Quality Criteria be used, while for groundwater no DAF be used and reliance should be directly on the primary MCLs. This rule is not establishing DAFs due to the lack of data the Agency has regarding the leachate potential for uses requiring SPLP testing, a lack of data to properly establish DAFs which would assure that chat use is safe and environmentally protective, and because the Agency did not use DAFs in evaluating the use of chat in hot mix asphalt. Therefore, we are requiring that chat used in PCC, granular road base, flowable fill, stabilized road base or chip seals undergo SPLP testing prior to its use and the results compared to the National Primary Drinking Water Standards for lead and cadmium and the freshwater chronic National Recommended Water Quality Criteria for zinc of 120 μg/l, without DAFs. Again, if the test results do not exceed the National Primary Drinking Water Standards for lead and cadmium and the freshwater chronic National Recommended Water Quality Criteria for zinc, the test results do not need to be submitted to EPA or the State for review and approval.

vii. Rationale for Use of Site-Specific Risk Assessments

As noted above, a chat user can conduct SPLP testing prior to use in PCC, granular road base, flowable fill, stabilized road base or chip seals to demonstrate, on a case-by-case basis, that the use of chat in such uses are safe and environmentally protective. If the results of such testing exceed the standards noted above, the chat user may still make another case-by-case showing by conducting a site-specific risk assessment. Our rationale for allowing chat uses based on site-specific risk assessments is to encourage greater use of chat provided the uses are safe and protective. We believe site-specific risk assessments conducted according to EPA guidelines referenced below will provide the necessary data to determine whether a proposed use is safe and protective. The Agency received comments on the April 4, 2006 proposal requesting that EPA allow these uses of chat. Some commenters argued that allowing these uses would encourage greater use of chat and facilitate the elimination of chat piles. They also suggested that these uses would be more protective of human health and the environment than the chat piles, however, the commenters did not

provide data or evidence to show that these uses are in fact safe and protective. Nevertheless, EPA agrees with the commenters that encouraging chat use, as long as uses are safe and environmentally protective, would lead to a quicker drawdown of the chat piles and ultimately benefit the communities where the piles are located. As a result, the use of chat in PCC, granular road base, flowable fill, stabilized road base or chip seals will be allowed in transportation construction projects if there is a demonstration through a site-specific risk assessment, as described below, that the use is safe and environmentally protective.

Such risk assessments involve analyses of how the leachate moves into surface or groundwater and whether metals concentrations down gradient from the chat use location will exceed relevant standards. Therefore, risk assessments involve the modeling of leachate in the environment and findings of whether, after such movement, health or environmental based standards are exceeded. This type of surface and groundwater modeling involves analysis of the type and concentration of metals in the leachate and their mobility. A commenter noted that the Agency should compare the results of modeling of leachate movement in ground water against the National Primary Drinking Water standards as the basis in determining if a use is protective. We generally agree with this position, as it applies to lead and cadmium. However, in some cases, drinking water standards may not be relevant for ground water, for example where it is already contaminated so that it is not suitable for drinking, and controls are in place to prevent consumption. Also, where the ground water drains into surface water, the reviewing agency should consider the freshwater chronic Water Quality Criteria for zinc of 120 µg/l.

EPA, or the State environmental agency, if the State chooses to do so, will determine whether the proposed use is safe and environmentally protective based on the information in the site-specific risk assessment. The agency conducting the evaluation may request additional information from the chat user to assure that the risk assessment meets EPA or State criteria and there is sufficient information to determine if the proposed use is safe and environmentally protective.

EPA, or the state if it chooses to do so, will solicit public input by a number of means; for example, it can publish its proposed determinations in a local newspaper, prior to making a final determination. In addition, EPA will provide sufficient time for the public to review and comment on the proposed decision. For example, EPA provides 45-days for public review and comment of proposed permit decisions under the hazardous waste regulations. Such timeframe may also be appropriate in this case. States might achieve the same level of public input by following a similar approach.

If a chat user decides to conduct a site-specific risk assessment, it is recommended that they consult with EPA or the State environmental agency to discus how best to conduct the risk assessment to reflect existing site conditions and receptors.

EPA has established guidelines on how to conduct risk assessments. These guidelines were developed to help guide EPA scientists in assessing risks to human health from chemicals or other agents in the environment. They also inform EPA decision makers and the general public about these procedures. When risk assessments are conducted, we recommend that these guidance documents be utilized (see *http://cfpub.epa.gov/ncea/cfm/nceaguid_human.cfm*). EPA's Superfund program has also developed guidance on how to conduct human health and ecological risk assessments. Those guidance documents can be accessed at: *http://www.epa.gov/oswer/riskassessment/superfund_hh_exposure.htm.*

viii. Uses Authorized by a State or Federal Response Action

This rule also establishes a criterion that other uses of chat in transportation construction projects funded, in whole or in part, with Federal funds will be safe and environmentally protective if they are part of, and otherwise authorized by, a State or Federal response action undertaken in accordance with Federal or State environmental laws. Such actions are undertaken with consideration of site-specific risk assessments, which account for the full variety of conditions at the site, such as existing contamination in assessing risks to human health and the environment. For example, Region 7 assessed the protectiveness of using unencapsulated chat as road base for a proposed highway bypass and, as a result of a site-specific risk assessment, determined that such use, compared to other alternatives, was a more protective action (*Engineering/Cost Analysis—Highway 71, Jasper County, Missouri,* USEPA Region 7, August 2000).

This approach was included in the proposal and the Agency did not receive any adverse comments on this approach. The Agency also discussed this option during the comment period with State environmental regulatory agencies who indicated that they supported the ability to utilize chat as a result of their response actions.

ix. Certification

At proposal, the Agency noted that the rule should include a certification requirement. A number of commenters objected to this requirement since they argued that this type of reporting would increase the cost of using chat and therefore discourage its use. The Agency noted at that time that the BIA had established a similar certification requirement for chat sold from lands under their authority.

The Agency does not agree that this rule's certification requirements will place an undue financial burden on chat users (see Economic impact section of this rule). In addition, the Agency believes that the certification requirement is necessary to assure that chat users comply with today's action, and that it is not used in a manner that would necessitate Federal or State cleanup actions. The certification will also serve as a means to inform State environmental agencies about the use of chat in their state.

This final rule requires that chat users must submit a signed, written certification to the environmental regulatory agency in the State where the chat is to be used within 30 days of the date of acquisition. The certification will contain the following information: location of origin of the chat, amount of chat acquired, and a Certification Statement that the chat used in this transportation project will meet the criteria established by this rule. If the chat is sold or otherwise transferred to another party, the acquirer shall provide a copy of the certification to the new owner of the chat. The new owner shall submit a certification according to § 278.4(a)(1). The new certification supersedes all previous certifications.

The acquirer of chat, and any other person that receives the chat, will also maintain copies of all of the following for three years; (a) A copy of the certification following transmittal to the State department(s) of the environment, and, as appropriate, (b) any SPLP testing results, or (c) any site specific risk assessments.

2. Non-Transportation Uses—Cement and Concrete Projects

Title VI of Section 6018 of the Safe, Accountable, Flexible, and Efficient Transportation Equity Act of 2005 (HR 3 or "the Act"), amended Subtitle F of the Solid Waste Disposal Act (42 U.S.C. 6961 *et seq.*) by adding Sec. 6006. This

provision also requires the Agency to develop environmentally protective criteria for the safe use of chat in cement and concrete projects. However, these criteria are only guidance and are not Federally enforceable since the Act requires only that transportation construction projects funded, in whole or in part, with Federal funds meet the criteria established in this rule.

Non-transportation uses of chat include its use as a raw material in the manufacture of cement and as an aggregate in PCC. This final rule establishes criteria as guidance for chat used in cement and concrete for non-transportation, non-residential projects. Specifically, chat used in cement and concrete in non-transportation construction projects should only be used in non-residential construction projects, and for structural purposes if, based on a case-by-case basis, a demonstration shows that the proposed use of chat is safe and environmentally protective. The remainder of this section discusses the approach and rationale for the approach taken.

a. What is our approach?

Based on the lack of leaching data available on the use of chat in PCC, the Agency is establishing guidance that chat used in cement and concrete projects for non-transportation uses rely on the same approach taken for the transportation use of chat used in PCC. That is, for such uses, the Agency recommends that chat only be used in cement and concrete for non-transportation, non-residential construction projects if, on a case-by-case basis, either: (1) Synthetic Precipitation Leaching Procedure (SPLP, EPA SW–846 Method 1312) tests are conducted on the proposed material and the leachate testing results show that concentrations in the leachate do not exceed the National Primary Drinking Water Standards for lead and cadmium and the fresh water chronic National Recommended Water Quality Criterion for zinc of 120 μg/l; or (2) EPA (or a State environmental Agency, if it chooses to do so) has determined, based on a site-specific risk assessment and after notice and opportunity for public comment, that the releases from the chat mixture in its proposed use will not exceed the National Primary Drinking Water Standards for lead and cadmium in drinking water sources and the fresh water chronic National Recommended Water Quality Criterion for zinc of 120 μg/l in surface water. It is recommended that such a finding should be subject to public notice and comment before any decision is final.

At proposal, the Agency sought comment on whether it should place some restrictions on the use of chat in cement and concrete in non-transportation projects. The proposal offered a restriction that chat used in such non-transportation projects be limited to non-residential uses. The Agency assessed information about potential exposure of metals in cement and concrete containing chat when used for residential purposes and was unable to find data on whether such use presented risks to human health or the environment. Due to the lack of information, the Agency proposed to limit potential exposures by limiting chat in cement and concrete to only non-residential uses. That is, the guidance would allow, after SPLP testing or site-specific risk assessment, chat in cement or concrete to be used in commercial and industrial uses. Some commenters supported this limitation to non-residential uses to limit potential human exposure to lead. Other commenters requested that such uses also be allowed in residential structural uses. However, the Agency did not receive data or information supporting this request. Considering the lack of data, the range of risks related to the residential use of chat in cement and concrete remains largely unknown, and that there is the potential for these uses to be used for ''sham recycling,'' the Agency believes it is prudent to maintain the non-residential restriction in our guidance, even though we recommend in this rule that a case-by-case demonstration be made that such use is safe and environmentally protective.

b. What is the rationale for this guidance?

As noted previously, the Peer Review Panel that reviewed the risk screen document and commenters to the proposed rule indicated that there was insufficient leachate data to characterize the risk from the use of chat in cement and concrete. Therefore, as we discussed previously, this guidance recommends that for non-transportation construction projects, chat only be used in cement and concrete for non-residential uses and only if a case-by-case showing is made, based on SPLP testing or a site-specific risk assessment, that the proposed use is safe and environmentally protective.

In the past, chat has been used in the manufacture of cement and used in concrete for building foundations and roads. Ash Grove Cement, in a communication with EPA (Memo to File: *Conversation with Ash Grove Cement Regarding Use of Chat*, which is available in the docket to this final rule), indicated that it had produced cement clinker in 2001–2003 using chat as a silica substitute. According to Ash Grove, the clinker produced with chat met American Society for Testing and Materials (ASTM) standards for clinker. However, Ash Grove is no longer producing cement with chat. The Agency also reviewed published data and conducted interviews with chat sellers and State regulators and determined that chat is not currently being used in cement manufacturing or in non-transportation PCC projects.

Pursuant to section 6006(a)(1) of the Act, the Agency reviewed the possible use of chat as aggregate in concrete, and as it did in its transportation construction projects evaluations, concludes that certain non-transportation uses of chat in concrete may be safe and environmentally protective. However, due to the lack of data for non-transportation uses, information is required that shows such uses are protective. Consequently, EPA recommends that using chat in cement and concrete be allowed only if a case-by-case showing is made that shows such use is safe and environmentally protective (see discussion under concrete in transportation uses for further details of the approach recommended and our rationale). To meet this goal, the Agency recommends that such non-transportation uses of chat in cement and concrete projects be limited to non-residential foundations, slabs, concrete wall panels, retaining walls, commercial and industrial parking areas and sidewalks. Other non-residential uses also may be approved after a review of SPLP test data or a site-specific risk assessment as described throughout this final rule. As noted previously, we would not recommend that chat be used in residential settings (*e.g.*, concrete countertops, sidewalks, foundations, slabs, driveways, roads).

There were comments raising concerns about the possible exposure of workers involved in non-transportation construction projects to chat in cement or concrete. The Agency has reviewed the Occupational Safety and Health Administration (OSHA) standards governing worker health and safety related to the construction and demolition of non-residential non-transportation uses of cement and concrete. Based on this review, the Agency concludes that existing standards require employers to provide adequate protection to workers from dusts and metals and these standards would extend to dusts and metals from cement and concrete containing chat. It should also be noted that when chat is

used as an aggregate in concrete, worker exposures would be limited since the metals would already be bound.

C. Relationship of This Rule to Other Federal Regulations and Guidance

For all uses of chat in transportation construction projects carried out, in whole or in part, with Federal funds that is affected by this action, users must meet the relevant specifications (*e.g.*, for durability, granularity) established by the relevant state departments of transportation and the Federal Highway Administration (FHWA), prior to it being used in transportation projects. This final rule does not affect or change these specifications and requirements.

The FHWA established minimum standards at 23 CFR Part 626 for Highways (including references to the AASHTO Standard Specifications for Transportation Materials and Methods of Sampling and Testing) and at 23 CFR Part 633, Required Contract Provisions. Aggregate requirements for Concrete include AASHTO–6, Fine Aggregate for Portland cement concrete and AASHTO–80, Coarse Aggregates for Portland cement concrete. Technical requirements for Hot Mix Asphalt include AASHTO–29, Fine Aggregate For Bituminous Paving Mixtures and ASTM D6155, Standard Specification for Nontraditional Coarse Aggregates for Bituminous Paving Mixtures. FHWA National Highway *Standard Specifications and Supplements* is divided into topic areas corresponding to the divisions used in the ''Guide Specifications for Highway Construction'' Manual published by the AASHTO and can be accessed at (*http://fhwapap04.fhwa.dot.gov/nhswp/servlet/LookUpAgency?category=Standard+Specifications+and+Supplements*) [12].

In addition, ASTM Standard C–33 restricts the amount of chert that may be mixed into PCC when the chert has a specific gravity (ratio of its density to the density of water) less than 2.4. Chat in the Tri-State area, a form of chert, has a specific gravity greater than 2.4 and thus, would not be limited by this standard. Chat does, however, have the potential to be a poor performing aggregate when used in PCC due to its potential alkali-silica reactivity (ASR) [13].

The Agency also assessed current regulation of dusts from milling and demolition. As part of this assessment, based on the Peer Review comments, the Agency conducted an additional risk screen from the milling of chat encapsulated in asphalt road surfaces. Based on this review and analyses, we conclude that exposure to fine particles released during milling and demolition operations would be limited to on-site workers (for the basis of this conclusion, see Section V). The Occupational Safety and Health Administration have established limits for worker exposure to the metals found in chat (29 CFR 1926.55—Safety and Health Regulations for Construction, Gases, Vapors, Fumes, Dusts, and Mists, available at: *http://www.osha.gov/pls/oshaweb/owastand.display_standard✖;group?p_toc_level=1&p_part_number=1926*). EPA has reviewed the OSHA standards (see Section V ''What Are the Environmental and Health Impacts?'' below) and concludes that the OSHA standards require adequate worker health and safety protection and thus, it is not necessary to promulgate additional standards to address this issue.

D. How Does this Rule Affect Chat Sales From Lands Administered by BIA or Directly From Tribal Lands?

BIA signed a Memorandum of Agreement with EPA Region 6 in February 2005, designed to lead to the renewed sale of chat from Tribal lands and from lands administered by BIA. EPA's rule does not prevent chat sales, nor is it intended to delay such sales. This rule is consistent with BIA's chat sales requirements.

The draft sales agreement prepared by BIA requires the submittal of a certification which requires buyers of chat from tribal lands to use it in a fashion which is deemed acceptable by EPA. This rule requires the same certification for the use of non-tribal chat.

E. How Does This Rule Affect CERCLA Liability, Records of Decision, and Response Actions?

If waste material, such as chat, is used in a way that creates a threat to human health or the environment, the owner of the property and the party responsible for creating the hazardous situation could be liable for conducting or financing a response action under CERCLA or State law.

This rule establishes criteria for chat use in federally funded transportation construction projects. However, such Federal funding does not include compensation for any response action as defined in CERCLA section 101 (25), (42 U.S.C. Section 9601 (25)) involving chat or other hazardous substances.

Finally, nothing in this rule shall affect existing RODs issued at EPA National Priorities List sites or Removal Decisions associated with chat nor does the rule affect the determination of liability as noted in CERCLA Sections 104, 106, and 107 or State corrective action decisions.

F. How Does This Rule Affect the Use of Federal Funds Administered by the U.S. Department of Transportation for Transportation Construction Projects?

Through Title VI of Section 6018 of the Safe, Accountable, Flexible, and Efficient Transportation Equity Act of 2005 (HR 3 or ''the Act''), Congress amended Subtitle F of the Solid Waste Disposal Act (42 U.S.C. 6961 *et seq.*) by adding Sec. 6006. This provision requires, among other things, for the Agency to develop environmentally protective criteria (including an evaluation of whether to establish a numerical standard for concentrations of lead and other hazardous substances) for the safe use of granular mine tailings from the Tar Creek, Oklahoma Mining District, known as ''chat,'' in transportation construction projects that are carried out, in whole or in part, using Federal funds. Section 6006(a)(4) requires that any such use meet EPA's established criteria.

As noted above, the oversight of Federal funds used in transportation is the responsibility of the U.S. DOT. Its policies and procedures related to the management of those funds can be found in the Code of Federal Regulations beginning at Title 23 Part 1(23 CFR 1). DOT requires that users of Federal transportation funds must comply with applicable State or Federal regulations (23 CFR 1.9 and 1.36). DOT will include reference to compliance with this rule in its guidance regarding the awarding of federal transportation funding.

V. Impacts of the Final Rule

A. What Are the Potential Environmental and Public Health Impacts From the Use of Chat in Transportation Construction Projects?

For the proposed rule, we conducted an assessment of the risks associated with the proposed use of chat. (See the preamble to the proposed rule at 71 FR 16729, April 4, 2006 and the *Report on Potential Risks Associated with the Use of Chat from the Tri-State Mining Area*

[12] State highway construction specifications can be found at the following internet web sites for Oklahoma (*http://www.okladot.State.ok.us/materials/700index.htm*), Kansas (*http://www.ksdot.org/burMatrRes/specification/default.asp*), and Missouri (*http://www.modot.State.mo.us/business/standards_and_specs/highwayspecs.htm*).

[13] The Agency also reviewed studies on the potential for alkali-silica reactions in chat concrete and concludes that it can be used if appropriate materials testing is conducted prior to use.

in Transportation Projects (RTI, 2006) for more details on this assessment.) Data from studies conducted by OU present total metal concentrations and leaching characteristics of (1) asphalt concrete surface and base mix formulations prior to roadway application, (2) asphalt and stabilized base samples from roads currently in use, (3) spent asphalt concrete samples that were broken up and stored in piles, and (4) milled asphalt concrete samples intended to simulate weathering. These studies show that the metals are tightly bound in the encapsulated matrix when the total metals concentrations in asphalt concrete samples are compared to corresponding TCLP and SPLP leachate concentrations. In particular, for asphalt concrete surface mix and stabilized road base uses for all four categories, the highest TCLP concentrations reported for lead and cadmium were below the toxicity characteristic (TC) regulatory limits (5 mg/L and 1 mg/L, respectively). In fact, when the metals were detected, in many cases, they were below the drinking water MCLs for lead and cadmium.[14] For zinc, when detected, the TCLP concentrations were found to be generally above the SMCL (5 mg/L) by up to a dilution and attenuation factor of 16. As we have noted earlier, however, we believe that use of the TCLP in evaluating the leaching potential of encapsulated chat used in transportation construction projects is inappropriate since it does not accurately reflect the environmental conditions of the management scenario. Rather, we believe the SPLP is a more appropriate test of the conditions expected to lead to leaching of metals from this material. In addition, where leachate testing was conducted using the TCLP and SPLP methods, in all cases, the concentrations of the metals were approximately an order-of-magnitude lower for the SPLP as compared to the TCLP. In most cases, the SPLP concentrations were below the MCLs for lead and cadmium and were always below the SMCL for zinc.

In summary, this assessment concluded that based on the available reports and data reviewed, the use of chat as an aggregate for hot mix asphalt poses negligible risks to human health through the groundwater exposure pathway, while some unencapsulated uses of chat may pose substantial risks to human health and the environment. The leachate data representing the binding capacity of the asphalt matrix—particularly in hot mix asphalt—show that the metals are tightly bound throughout the life of these products.

By inference and based on limited data, it appears as though certain other uses of chat, such as chat contained PCC, flowable fill and stabilized base would have similar binding properties that would reduce the leaching of metals. However, the available leachate data on these uses are very limited, and may be a concern given the volume of chat that could be used in road construction projects.

In addition to these data deficiencies on specific uses, we identified other data gaps with respect to risk, including the milling of chat-containing asphalt concrete. Milling of asphalt concrete roadways during resurfacing would likely release to the air fine chat particles, which could lead to contamination of residential soils and homes located in the vicinity of a road construction project. Our assessment concluded that these events would be episodic and infrequent (corresponding to approximately once over a 15 year lifespan of the asphalt), resulting in transitory exposures of relatively short durations. The Agency assumed that the milling operations would be subject to regulations and best management practices that would protect the health of workers. However, the data were not available to evaluate the potential exposures to nearby residents from chat concrete particles blowing on to residential areas. The assessment concluded, however, that the uncertainty of the exposures to residents from milling and management of encapsulated chat products during road resurfacing could be an area for future study.

The Agency also considered in its assessment non-transportation uses and the demolition of structures containing chat. We did not perform any environmental modeling as with the evaluation of transportation uses. However, with existing fugitive dust regulations and demolition practices, we concluded that exposures from dust generated during the use or demolition of chat in concrete buildings would not pose significant risks to human health.

Concurrent with the public notice and comment period for the proposed rule, the Agency conducted an external peer review of its assessment, *Report on Potential Risks Associated with the Use of Chat from the Tri-State Mining Area in Transportation Projects*. Based on the comments received from the public and from the Peer Reviewers, the Agency has revised the screening evaluation report to reflect those comments. The following discussion provides the Agency's response to the major comments received from the peer reviewers. In addition, the revised report and our response to comments are provided in the docket for this rule.

The following are the major issues raised by the peer reviewers and the Agency's responses.

(1) Potential Exposures During the Milling Process Were Not Evaluated

The peer review commenters believe that the lack of data on air emissions from the grinding of the road surface prior to resurfacing (''milling'') is a considerable source of uncertainty in evaluating the potential risks of using chat in hot mix asphalt. They contend that potential exposure to chat dust generated during the milling of asphalt concrete roads, in addition to the storage of milled materials, should be evaluated through pathways that consider both the inhalation of dust and the incidental ingestion of metals contaminated soil from areas adjacent to a roadway being milled. In addition, peer review commenters noted two additional concerns associated with the milling process: (a) Addressing the short-term exposure of lead to a developing fetus or young child during critical and sensitive periods of growth, and (b) considering background levels of lead in the screening analysis.

The Agency believes that the concerns raised by the peer reviewers are valid and conducted further study to address them. Specifically, we performed a screening analysis to evaluate exposures through direct inhalation of air emissions associated with milling and incidental ingestion by a child of metals-containing soils adjacent to a milled roadway. The assessment was designed to be conservative by selecting both a methodology and the use of high-end parameters that result in upper-bound estimates of hazard and risk. Examples of high-end parameters used in the screen are: (1) Total metals concentrations for lead, zinc, and cadmium from the 2005 OU study where chat comprised 40% of the aggregate used in hot mix asphalt, where typical hot surface mix includes up to 20% chat, (2) the risk screen utilized maximum, hourly air concentrations, rather than an average concentration for inhalation exposure to an adult and also to a child (using the Agency's Integrated Exposure Uptake Biokinetic Model for lead in Children (IEUBK), (3) the risk screen assumed the placement of the milled asphalt concrete storage pile on the side of a

[14] Comparisons of leachate concentrations with drinking water criteria assume that no dilution or attenuation occurs before the dissolved metals reach a drinking water well or surface water. The Agency believes this worst case scenario is highly unlikely to occur in the area of the country where the use of chat is occurring.

road closest to a receptor and locating the receptors at the point of maximum off-site air concentration, (4) the risk screen assumed exposure to chat dust occurs 24 hours/day, for seven days a week, and (5) protective assumptions were used with respect to emissions factors for street sweeping and storage pile loading/unloading operations and meteorological conditions.

The results of this additional analysis show that the milling of chat in asphalt concrete roadways will not adversely affect public health. Specifically, for the direct inhalation pathway, the highest cancer risk predicted for cadmium was 2×10^{-9} (that is, 2 excess cases of cancer per 1,000,000,000 people exposed to the estimated air concentration). The highest non-cancer hazard quotient for cadmium was 0.004 (a hazard quotient is the ratio of the air concentration of cadmium and the level at which no adverse effects are expected; if the hazard quotient is less than 1, then no adverse health effects are expected as a result of exposure). For the direct ingestion of soil adjacent to the roadway, the predicted concentrations of metals in soil were 37.6 (Zn), 3.2 (Pb), and 0.2 (Cd) mg/kg soil, all of which are below (a) The generic EPA Superfund Soil Screening Levels (SSLs) for cadmium and zinc, (b) the 400 ppm CERCLA/RCRA screening level for lead in residential soils, and (c) the background soil concentrations for the western U.S. The comparison with background concentrations was intended to provide additional insight into the contribution to the current environmental "burden" of these metals in the area in which chat-containing surface mixes could be used. A soil concentration below background levels suggests that the milling operations will not result in significant increases in the zinc, lead, and cadmium concentrations in soil.

In order to address the concern of lead exposures for children, the Agency used the IEUBK model, which includes multiple pathways of lead exposures (for example, inhalation of dust, ingestion of soil and dust, and dietary intake), and is considered a good predictor of potential long-term blood-lead levels for children in residential settings. We ran the IEUBK model using the maximum air concentration estimated from the direct inhalation analysis, and both the soil concentration we estimated due to milling operations and a separate analysis using a background soil concentration for lead reported in the western U.S. In both cases, a hypothetical child exposed to the estimated air and soil levels resulted in a chance of less than 5% of exceeding a 10µg/dL blood-lead level. The blood-lead levels predicted were 4.328µg/dL and 4.473µg/dL, respectively, from the lead levels we estimated in soil from milling operations and for background soils. The criterion of no more than a 5% chance of exceeding a 10µg/dL blood-lead level is the current Agency guidance level. The Center for Disease Control considers a blood-lead level of 10µg/dL to be of concern for children.

A complete discussion of the screening analysis for the milling of asphalt concrete roads is available in the public docket supporting this final rule. In addition, the screening level analysis was reviewed by selected Agency experts in the fields of emissions modeling and risk assessment. Their comments are also in the docket supporting this final rule. Responses to their comments are reflected in the final document for the screening analysis (RTI, 2007).

(2) Demolition

The peer review commenters raised concerns that dusts resulting from the demolition of chat contained in asphalt concrete and PCC could pose a threat to human health. Road surfaces using chat may also be demolished at the end of their useful life (like conventional asphalt concrete, the useful life could be on the order of 15 years). The demolition of road surfaces containing chat would likely involve low emissions of chat dust particles, theoretically with subsequent dispersion and deposition to nearby soils. Based on discussions with demolition contractors, it is apparent that dusts from such demolitions are regulated under the State fugitive dust regulations. Exposure to such dusts probably would be limited to workers because existing State regulations require that dusts be contained within the area of origin. As noted elsewhere in this preamble, OSHA has established exposure limits for dusts and metals for workers in construction and demolition. Most, if not all, road concrete which is demolished is reused as fill or as road base. Based on the information noted above, the Agency concludes that exposure to chat in demolished pavement does not present a significant risk.

(3) Data Are Insufficient To Establish Risks From the Use of Encapsulated Chat in Products Other Than Hot Mix Asphalt

The peer review commenters noted that there is very limited information to determine whether the use of chat in products other than HMA poses low risk. One of the Peer Reviewers stated that it is "likely that the risk from other encapsulated forms will be closer to HMA than to unencapsulated forms, but it is not possible to state how close it will be to the HMA risks."

The Agency generally agrees that data are insufficient to determine if the use of specific products other than HMA evaluated in the *Report on Potential Risks Associated with the Use of Chat from the Tri-State Mining Area in Transportation Projects* are environmentally safe. Consequently, as discussed elsewhere in this preamble, the Agency is allowing the use of chat in Portland cement concrete products (and certain other uses) if a person can demonstrate, on a case-by-case basis, either that: (1) Synthetic Precipitation Leaching Procedure (SPLP, EPA SW–846 Method 1312) tests are conducted on the proposed material and the leachate testing results show that concentrations in the leachate do not exceed the National Primary Drinking Water Standards for lead and cadmium and the fresh water chronic National Recommended Water Quality Criterion for zinc of 120 ug/l [15]; or (2) EPA (or a State environmental Agency, if it chooses to do so) has determined, based on a site-specific risk assessment and after notice and opportunity for public comment, that the releases from the chat mixture in its proposed use will not cause an exceedance of the National Primary Drinking Water Standards for lead and cadmium in potential drinking water sources or the fresh water chronic National Recommended Water Quality Criterion for zinc of 120 ug/l in surface water.

We believe this approach directly addresses the Peer Review commenters concerns, while at the same time allow persons to proceed with the use of chat in other products or activities if they can make the relevant showing.

(4) Non-Transportation Risks-Demolition

Peer review commenters requested that the Agency carefully review whether existing regulations adequately protect workers from the demolition of chat encapsulated materials. To address that request, this assessment considered how dust generated during the demolition of nonresidential buildings which used chat encapsulated in PCC would occur and whether regulations address worker exposure.[16] The Agency

[15] It should be noted that this case-by-case showing does not require public notice and comment.

[16] The American National Standards Institute ANSI–A 10.6–1983 American National Standard for Demolition Operations Safety Requirements set minimum dust exposure limits and recommends

Continued

assumed that such buildings would be demolished once every 30 years, based on the Internal Revenue Service allowable straight-line depreciation for non-residential real property of 31.5 years. The Agency determined that demolition practices, as noted by the National Association of Demolition Contractors, would generally generate dusts for periods rarely in excess of 20–30 minutes when buildings are imploded. Furthermore, the Agency has reviewed the fugitive dust demolition regulations in Oklahoma, Missouri, and Kansas and found that building demolition requires a general fugitive dust permit that mandates that demolition related dusts be contained within the property line (most often through the use of water sprays). Based on this information, the Agency concludes that dusts from the demolition of nonresidential buildings with chat contained in PCC are not likely to present a significant threat to human health.

Even if chat metal levels do not trigger OSHA requirements, however, other OSHA controls would still be utilized to address worker health risks from exposure to fine particulates, which indirectly addresses the issues associated with chat. In particular, demolition of concrete structures is known to produce extremely fine particles of crystalline silica. Breathing crystalline silica dust can lead to silicosis, a commonly known health hazard which has been associated historically with the inhalation of silica-containing dusts. Silicosis is a lung disease which can be progressive and disabling; it can lead to death. The OSHA standards for exposure to dust, (29 CFR 1926.55) prohibit employee exposure to any material at concentrations above those specified in the ''Threshold Limit Values of Airborne Contaminants for 1970.'' OSHA has established for crystalline silica dust a Permissible Exposure Level which is the maximum amount to which workers may be exposed during an 8-hour work shift. NIOSH has recommended an exposure limit of 0.05 mg/m^3 as a time-weighted average for up to a 10-hour workday during a 40-hour workweek. Although the Agency has no reason to believe that chat contained in PCC would increase the levels of fine particulates, including crystalline silica, we believe the OSHA/NIOSH standards will provide adequate protection to workers from potential exposure.

that no worker shall be permitted in any area that can adversely affect them when demolition operations are being performed.

OSHA has also established worker health and safety standards specific to building demolition in 29 CFR 1926 Subpart T. These standards require an engineering survey of the building prior to demolition to identify any risks and implementation of project wide dust controls. The standards also require compliance with NIOSH respirable dust standards which essentially require the use of respirators, if standards noted in 29 CFR 1910 are exceeded. Based on the Agency's review of the OSHA standards, we conclude that these regulations provide adequate protection to onsite demolition workers.

One of the Peer Reviewers noted that NIOSH and OSHA standards may not apply to county or State highway workers and that those safeguards would not actually protect workers potentially exposed to dusts during milling or demolition. The Agency has reviewed State and Federal worker health and safety laws as they apply to demolition, and does not agree that there is insufficient regulatory protection of workers. The commenter also noted that existing regulations are not being enforced. While the Agency has not been able to determine whether this allegation is accurate, it is beyond the scope of this effort to determine whether these regulations are being enforced by the states or others.

(5) The Risk From the Generation of Chat Fines During Processing Was Not Evaluated

The peer review commenters noted that the rule should include criteria addressing the handling and disposal of chat fines resulting from the wet sizing of chat. First, the Agency would note that this final rule does not require that the raw chat be washed or sized prior to being used. Therefore, any fines that are generated would not be the result of this rule. Nevertheless, the Agency evaluated the risks from exposure to fines from chat washing facilities during Superfund Site investigations at the NPL Sites in the Tri-State Mining District. The information we have shows that fines may release metals into the environment. However, the release of these metals can be effectively controlled by EPA through its oversight authority of the Tar Creek Superfund site. In addition, we believe that most chat washing will continue to be conducted at the two known commercial chat washing facilities located within the Superfund Sites. However, to the extent that other chat washing facilities become operational, we also believe that they will be adequately controlled based on our review of the air and water regulations in Oklahoma, Missouri and Kansas. (See Section III for a discussion of EPA's evaluation of the states regulatory programs to control air and water releases at asphalt plants, PCC plants and chat washing facilities.)

(6) Ecological Risks

The peer review commenters noted that there should be a more comprehensive analysis of the ecological risks from chat use. Environmental quality information presented in several studies indicated that damages to streams had been documented for the Tri-State Mining Area; however, these studies did not address encapsulated chat uses, but were from multiple sources of contamination associated with lead and zinc mining, including subsurface sources (flooded mine shafts), surface sources (chat piles, tailing sites), and smelting operations. SPLP analyses for chat encapsulated in hot mix asphalt (OU, 2005) shows that zinc concentrations, when detected, were below EPA's National Recommended Water Quality Criteria (*http://www.epa.gov/waterscience/criteria/wqcriteria.html*) for the protection of aquatic life. This study did not find detectable levels of lead or cadmium in any leachate using the SPLP method. We do not foresee that environmental conditions could occur where metals from chat used in transportation projects, that are funded, in whole or in part, using Federal funds, would reach surface waters at levels of concern either through run-off to nearby soils, which would have subsequent attenuation before reaching surface waters, or via the groundwater pathway, which would have additional attenuation and dilution in groundwater before reaching nearby receiving waters.

B. What Are the Economic Impacts?

This Part summarizes projected cost impacts, economic impacts, and benefits associated with this final rule. A brief market profile is first discussed, followed by specification of the economic baseline. Costs and economic impacts are next discussed. These estimates are presented on an annualized basis. Finally, this Part presents a qualitative discussion of potential benefits associated with this final rule.

1. Chat Market Profile

Chat is a byproduct of mining and milling operations that has been exempted from regulation as a ''hazardous waste'' under Subtitle C of

RCRA.[17] However, it can pose risks to human health and the environment. Currently, chat in the Tri-State Mining District is found in above-ground piles of varying sizes, reflecting the different types of mining operations that occurred in each area. The total quantity of chat in the Tri-State Mining District is roughly 100 million tons. A small percentage of this total is currently used annually in road building or other beneficial use projects.

A small, but well-established market for chat in transportation applications currently exists. The preparation and use of chat is dominated by a few small operations that purchase, process, and sell chat to area hot mix asphalt plants for use as an aggregate. Approximately 95 percent of all current chat use is for aggregate in hot mix asphalt. A wide range of different projects comprise the remaining 5 percent.[18] We have no evidence there is any current use of chat in cement or Portland cement concrete.

The demand for chat as aggregate in transportation uses is price sensitive and is limited by various technical and performance standards. However, consistent demand exists as long as chat can be provided at prices that are competitive with other sources of aggregate. The key cost drivers for chat include raw material costs, processing and sizing, if conducted, and transportation. The current market price for chat, and other forms of aggregate, is approximately five dollars per ton. This estimate excludes transport cost, but includes processing and sizing, even though such operations are not required as part of this rule.

A limited number of small companies act as brokers, processors and distributors (washers and haulers) of the chat in the Tri-State Mining District. Chat haulers and washers buy chat from several owners, each typically owning only a small amount of the total quantity of chat. Chat is both privately and publicly owned, including chat piles located on land controlled by the Quapaw Tribe of Oklahoma.

Historical trends and information from regional chat suppliers suggest that the demand for chat for transportation-related uses is unlikely to change significantly over the next couple of decades. The currently viable market is well defined and transportation costs make chat economically unattractive beyond current market limits. Within the current market, rates of growth for new roads are modest (estimated at less than 2 percent per year) and population densities are low in areas where the use of chat is economically competitive. We are not able to determine what, if any, impact this rule may have on chat demand for use in asphalt concrete. Significant chat use in other applications, such as Portland cement concrete, does not appear to be viable at this time either for economic or other reasons.

2. Cost Impacts

The value of any regulatory action is traditionally measured by the net change in social welfare that it generates. Our economic assessment conducted in support of this rule evaluated compliance costs only. Social costs are not assessed due to data limitations and the lack of equilibrium modeling capabilities associated with this industry. The data applied in this analysis were the most recently available at the time of the analysis. Because our data and analytical techniques were limited, the cost impact findings presented here should be considered generalized estimates.

Our cost analysis examined the potential impact of the rule based on the use of encapsulated chat that comes from the Tri-State Mining District. Ninety-five percent of all chat that is used beneficially is used in hot mix asphalt transportation construction applications. Our cost analysis, therefore, focused on the use of chat as aggregate in hot mix asphalt. Chat may also be used for a variety of non-asphalt transportation and commercial building products.

However, available data appear to indicate that non-asphalt uses of chat from the Tri-State area generally are not common either due to economics or a lack of demand.

Our analysis indicates that the incremental cost impacts associated with this rule are approximately $210,000 per year. This estimate incorporates costs associated with certification, recordkeeping and reporting. Sampling and analysis costs, if any, for use in concrete pavement and nonresidential concrete are not included because the Agency is unaware of any such use currently taking place and further believes that such use, if it occurs, will be minimal. Additional "expanded use" scenarios are examined in the economic support document prepared for this action: *Assessment of the Potential Costs, Benefits, and Other Impacts of Chat Use in Transportation Projects,* December 18, 2006. This document is available in the docket established for this final rule.

3. Economic Impacts

Our findings indicate that this final rule is unlikely to result in any significant economic impacts to chat suppliers or users in the short term. However, the potential impact of this rule on chat use over the next ten to twenty years is undetermined. As a result, it is not possible to estimate regional or local economic impacts over the long term.

4. Benefits

This final rule is designed to establish standards intended to clarify and facilitate the safe use of chat in transportation applications carried out, in whole or in part, with Federal funds. The social benefits of this action are related to reduced human health and environmental damage in the Tri-State Mining District associated with the timely removal of chat from existing piles. Should there be no accelerated use of chat in transportation projects above the current annual rate, human health and environmental benefits may be equivalent to those expected under a no action baseline.

VI. State Authority

This final rule is promulgated under the authority of RCRA Section 6006. It becomes effective in all relevant States on its effective date of September 18, 2007; after that date, chat cannot be used in federally funded transportation projects except in compliance with today's regulations, regardless of current State law. At the same time, nothing in this rule restricts the authority of States, under State law, to establish different requirements or procedures for the use of chat in federally funded transportation projects. States are neither expected nor required to pick up this rule or to seek approval or authorization.

Several provisions of this final rule directly affect States. Specifically, Section 278.3(b)(2) prohibits the use of chat in Portland cement concrete or in certain other uses (in Federally funded transportation projects,) unless approved by EPA or the State environmental agency, if the State chooses to be the approving entity, where the use will occur. While the rule would allow either EPA or the relevant State agency to approve such uses, EPA ordinarily expects to defer to the State where a potential chat user requests approval. EPA would only expect to act where the State preferred not to, and in these cases, it would work in close consultation with the State. In addition,

[17] See 40 CFR 261.4(b)(7).

[18] Current other uses of chat include: component in anti-skid surfaces, sand blasting material, and waste water treatment filters. The Agency believes that additional evaluation, outside the scope of this rule, is necessary to determine the environmental suitability of using chat as sand blasting or as filter media.

Section 278.3(b)(3) provides that EPA or a State, if it chooses to do so, may approve the use of chat authorized as part of a State or Federal response action undertaken pursuant to applicable Federal or State environmental laws. In such cases, EPA expects that the State would rely on its existing cleanup regulations and procedures in approving the use.

VII. Statutory and Executive Order Reviews

A. Executive Order 12866: Regulatory Planning and Review

Under Executive Order (EO) 12866 (58 FR 51735, October 4, 1993), this action is a "significant regulatory action." This action may raise novel legal or policy issues [3(f)(4)] arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order. Accordingly, EPA submitted this action to the Office of Management and Budget (OMB) for review under EO 12866. Any changes made in response to OMB recommendations have been documented in the docket for this action.

This rule is projected to result in cost impacts of approximately $210,000 per year. This figure is significantly below the $100 million threshold established under part 3(f)(1) of the Order. In addition, this rule is not expected to adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities. Thus, this rule is not considered to be an economically significant action.

We have prepared an economic assessment in support of this rule. This document is entitled: *Assessment of the Potential Costs, Benefits, and Other Impacts of Chat Use in Transportation Projects,* December 18, 2006. Findings from this document are briefly summarized under Section V. B above.

B. Paperwork Reduction Act

The information collection requirements in this rule have been submitted for approval to OMB under the *Paperwork Reduction Act,* 44 U.S.C. 3501 *et seq.* via this preamble instead of a separate Information Collection Request (ICR) document.

The certification, reporting, and record keeping required under this rule is necessary to ensure the safe use of the product containing chat. Certification, recordkeeping and reporting requirements under this rule are not subject to confidentiality restrictions.

Since the burden associated with this rule is insignificant, a separate ICR is not necessary. The burden is projected to affect a limited number of entities. These include: three State governments (Oklahoma, Missouri, Kansas), one Native American tribe (Quapaw Tribe of Oklahoma), and no more than fifty sand and gravel companies located in the States of Oklahoma, Missouri, and Kansas (NAICS 4233202).

The burden on respondents is estimated at 3,800 hours per year, with a total annual cost ranging from $152,000 to $228,000, depending upon labor costs. Respondents would also need to read and understand the rule. The burden associated with reviewing the regulation is estimated at 100 hours, with a total annual cost estimated at $5,000. The burden on governmental entities is estimated at 380 hours per year, with total costs ranging from $15,200 to $22,800 per year. These estimates do not include costs related to a user making a case-by-case showing to EPA or a State environmental agency that a proposed use is safe and environmentally protective. Those costs are not included because the Agency believes that there will be very few such requests made in any one year. All these estimates are summarized in the Table below.

SUMMARY OF ESTIMATED BURDEN TO RESPONDENTS AND GOVERNMENT

Activity	Number of hours per project	Estimated cost per hour	Estimated number of affected projects per year	Estimated total annual burden (hours)	Estimated total annual cost
Burden to Respondents:					
Certification, Reporting, Record keeping	5.0	$40–$60	760	3,800	$152,000–$228,000
Burden to Government (affected States):					
Certification review and recordkeeping	0.5	40–60	760	380	15,200–22,800

Note: The additional burden to respondents associated with reading and understanding the regulation is estimated at 100 hours, with a total average annual cost estimated at $5,000.

Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose or provide information to or for a governmental entity. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information.

An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations in 40 CFR are listed in 40 CFR part 9.

C. Regulatory Flexibility Act

The Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), 5 U.S.C. 601 *et seq.,* generally requires an agency to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedure Act, or any other statute. This analysis must be completed unless the agency is able to certify that the rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small not-for-profit enterprises, and small governmental jurisdictions.

The RFA provides default definitions for each type of small entity. Small entities are defined as: (1) A small business as defined by the Small Business Administration's (SBA) regulations at 13 CFR 121.201; (2) a small governmental jurisdiction that is a government of a city, county, town, school district or special district with a

population of less than 50,000; and (3) a small organization that is any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.

After considering the economic impacts of today's final rule on small entities, I certify that this action will not have a significant economic impact on a substantial number of small entities. This section summarizes whether the rule establishing criteria for the use of chat in transportation construction projects, carried out, in whole or in part, with Federal funds, may adversely impact small entities. The market for both chat and ''virgin'' aggregate in hot mix asphalt production is mature and dominated by small businesses. In order to have a significant economic impact on a substantial number of small businesses, the criteria for chat use would have to cause a significant decrease in the quantity of chat that is used in highway applications. Our analysis indicates that the current market area is not likely to experience any significant change in the demand for chat as a result of the rule. That is, while many chat processors, distributors, and users of chat are small businesses, significant economic impacts on a substantial number of these entities are not expected.

The reader is encouraged to review our regulatory flexibility screening analysis prepared in support of this determination. This analysis is incorporated into the ''Assessment'' document, as referenced above.

D. Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Pub. L. 104–4, establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, local, and tribal governments and the private sector. Under section 202 of the UMRA, EPA generally must prepare a written Statement, including a cost-benefit analysis, for proposed and final rules with ''Federal mandates'' that may result in expenditures to State, local, and tribal governments, in the aggregate, or to the private sector, of $100 million or more in any one year. Before promulgating an EPA rule for which a written Statement is needed, section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205 allows EPA to adopt an alternative other than the least costly, most cost-effective or least burdensome alternative if the Administrator publishes with the final rule an explanation why that alternative was not adopted. Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including tribal governments, it must have developed under section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant Federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements.

This final rule contains no Federal mandates (under the regulatory provisions of Title II of the UMRA) that may result in expenditures of $100 million or more for State, local, and tribal governments, in the aggregate, or the private sector in any one year. The total costs of this action are estimated at $0.21 million per year.

E. Executive Order 13132: Federalism

Executive Order 13132, entitled ''Federalism'' (64 FR 43255, August 10, 1999), requires EPA to develop an accountable process to ensure ''meaningful and timely input by State and local officials in the development of regulatory policies that have Federalism implications.'' ''Policies that have Federalism implications'' is defined in the Executive Order to include regulations that have ''substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.''

This rule does not have Federalism implications. It will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132. The rule focuses on establishing criteria for chat use in transportation construction projects, carried out, in whole or in part, with Federal funds, without affecting the relationships between Federal and State governments. Thus, Executive Order 13132 does not apply to this rule.

Although section 6 of Executive Order 13132 does not apply to this rule, EPA did consult with representatives of State governments in developing this rule. Representatives from the States of Kansas, Missouri, and Oklahoma provided valuable input.

F. Executive Order 13175: Consultation and Coordination With Indian Tribal Governments

Executive Order 13175: Consultation and Coordination with Indian Tribal Governments (65 FR 67249, November 9, 2000), requires EPA to develop an accountable process to ensure ''meaningful and timely input by tribal officials in the development of regulatory policies that have tribal implications.'' ''Policies that have tribal implications'' is defined in the Executive Order to include regulations that have substantial direct effects on one or more Indian tribes, on the relationship between the Federal Government and Indian tribes, or on the distribution of power and responsibilities between the Federal Government and Indian tribes.

Under Executive Order 13175, EPA may not, to the extent practicable and permitted by law, issue a regulation that has tribal implications, that imposes substantial direct compliance costs for which the Federal government does not provide funds to pay such costs, and that is not required by statute, unless EPA consults with tribal officials early in the process of developing the regulation. Similarly, to the extent practicable and permitted by law, EPA may not issue a regulation that has tribal implications and that preempts tribal law unless EPA, among other things, consults with tribal officials early in the process of developing the regulation.

EPA has concluded that this rule does not have tribal implications in that it does not have substantial direct effects as specified in the Executive Order. In particular, EPA notes that this rule does not impose substantial direct compliance costs or pre-empt tribal law. However, the Agency recognizes the significant interest that some tribes have in this rule. Specifically, some chat piles are located on Indian country lands. Allotted lands of the Quapaw Tribe of Oklahoma (Quapaw Tribe) are estimated to contain about half of the 29 chat piles located within the Picher Mining Field site. This rule is not expected to significantly change the demand for, and income from, chat use. To the extent this rule encourages the removal of chat from existing piles, there is likely to be an improvement to the environment and human health in these areas.

During the development of this final rule, the Agency carefully reviewed comments submitted on the proposal by the Quapaw Tribe. Agency personnel also consulted with representatives of

the Quapaw Tribe to assure the tribe that their concerns were given due consideration.

G. Executive Order 13045: Protection of Children From Environmental Health Risks and Safety Risks

Executive Order 13045 ''Protection of Children from Environmental Health Risks and Safety Risks'' (62 FR 19885, April 23, 1997) applies to any rule that: (1) Is determined to be ''economically significant'' as defined under Executive Order 12866, and (2) concerns an environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children. If the regulatory action meets both criteria, the Agency must evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the Agency.

This final rule is not subject to the Executive Order because it is not economically significant as defined in Executive Order 12866, and because the Agency does not have reason to believe the environmental health or safety risks addressed by this action present a disproportionate risk to children.

H. Executive Order 13211: Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use

This rule is not a ''significant energy action'' as defined in Executive Order 13211, ''Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use'' (66 FR 28355 (May 22, 2001)) because it is not likely to have a significant adverse effect on the supply, distribution, or use of energy.

I. National Technology Transfer and Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (''NTTAA''), Public Law No. 104–113, 12(d) (15 U.S.C. 272 note) directs EPA to use voluntary consensus standards in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies. The NTTAA directs EPA to provide Congress, through OMB, explanations when the Agency decides not to use available and applicable voluntary consensus standards. This rule does not require the application of technical standards (e.g., materials specification, sampling, analyses). As such, the National Technology Transfer and Advancement Act does not pertain to this action.

J. Executive Order 12898: Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations

Executive Order 12898 (59 FR 7629 (Feb. 16, 1994)) establishes Federal executive policy on environmental justice. Its main provision directs Federal agencies, to the greatest extent practicable and permitted by law, to make environmental justice part of their mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations in the United States.

EPA has determined that this final rule will not have disproportionately high and adverse human health or environmental effects on minority or low-income populations because it does not affect the level of protection provided to human health or the environment. Our analysis indicates that chat piles in the Tri-State Mining District are, in some cases, located near low-income populations. In addition, Quapaw allotted lands are located within the Picher Mining Field. Existing data on the human health and ecological impacts associated with chat suggests that these populations may be adversely affected by the presence of the chat piles. Thus, the removal of the chat from piles for transportation construction applications that are considered protective of human health and the environment would likely have a positive impact on these communities.

K. Congressional Review Act

The Congressional Review Act (CRA), 5 U.S.C. 801 *et seq.*, as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a final rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. Prior to publication of this final rule in the **Federal Register**, we will submit all necessary information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States. Under the CRA, a major rule cannot take effect until 60 days after it is published in the **Federal Register**. This action is not a ''major rule'' as defined by 5 U.S.C. 804(2).

List of Subjects in 40 CFR Parts 260 and 278

Environmental protection, Chat, Certification and recordkeeping requirements, Incorporation by reference, Indians—lands, Mine tailings, Waste.

Dated: June 5, 2007.

Stephen L. Johnson,

Administrator.

■ For the reasons set out in the preamble, title 40, chapter I of the Code of Federal Regulations is amended as follows:

PART 260—[AMENDED]

■ 1. The authority citation for part 260 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912(a), 6921–6927, 6930, 6934, 6935, 6937, 6938, 6939, and 6974.

■ 2. Section 260.11 is amended by revising the first sentence in paragraph (a) and paragraph (c)(3)(vii) to read as follows:

§ 260.11 References.

(a) When used in parts 260 through 268 and 278 of this chapter, the following publications are incorporated by reference. * * *

* * * * *

(c) * * *

(3) * * *

(vii) Method 1312 dated September 1994 and in Update III, IBR approved for part 261, appendix IX and § 278.3(b)(1).

■ 3. Part 278 is added to read as follows:

PART 278—CRITERIA FOR THE MANAGEMENT OF GRANULAR MINE TAILINGS (CHAT) IN ASPHALT CONCRETE AND PORTLAND CEMENT CONCRETE IN TRANSPORTATION CONSTRUCTION PROJECTS FUNDED IN WHOLE OR IN PART BY FEDERAL FUNDS

Authority: 42 U.S.C. 6961 *et seq.*

§ 278.1 Definitions.

(a) *Asphalt concrete*—a layer, or combination of layers, composed of a compacted mixture of an asphalt binder and mineral aggregate.

(b) *Chat*—waste material that was formed in the course of milling operations employed to recover lead and zinc from metal-bearing ore

minerals in the Tri-State Mining District of Southwest Missouri, Southeast Kansas and Northeast Oklahoma.

(c) *Chip seal*—a material composed of aggregate placed on top of a layer of an asphalt or asphaltic liquid binder. The aggregate may be rolled into the binder.

(d) *Cold mix asphalt*—refers to an asphalt and aggregate mixture composed of binders, soaps, or other chemicals which allow its use when cold

(e) *Epoxy seal*—refers to the mixture of aggregate in epoxy binders. Epoxy seals are typically used as an anti-skid surface on bridge decking

(f) *Federal or State response action*—State or Federal response action undertaken pursuant to applicable Federal or State environmental laws and with consideration of site-specific risk assessments.

(g) *Flowable fill*—a cementitious slurry consisting of a mixture of fine aggregate or filler, water, and cementitious materials which is used primarily as a backfill in lieu of compacted earth.

(h) *Granular road base*—road base typically constructed by spreading aggregates in thin layers of 150 mm (6 inches) to 200 mm (8 inches) and compacting each layer by rolling over it with heavy compaction equipment. The aggregate base layers serve a variety of purposes, including reducing the stress applied to the sub grade layer and providing drainage for the pavement structure. The granular sub base forms the lowest (bottom) layer of the pavement structure and acts as the principal foundation for the subsequent road profile.

(i) *Hot Mix Asphalt*—a hot mixture of asphalt binder and size-graded aggregate, which can be compacted into a uniform dense mass. Hot mix asphalt also includes hot mix asphalt sub bases and hot mix asphalt bases.

(j) *Microsurfacing*—polymer-modified slurry seal.

(k) *Portland cement concrete (PCC)*—pavements consisting of a PCC slab that is usually supported by a granular (made of compacted aggregate) base or sub base.

(l) *Pozzolanic*—a siliceous material which when combined with calcium hydroxide in the presence of moisture exhibits cementitious properties.

(m) *Slurry seal*—refers to a material composed of emulsified asphalt, aggregate, and mineral fillers, such as Portland cement or lime which is applied as a thin coating on top of asphalt concrete or Portland cement concrete road surfaces.

(n) *Stabilized base*—a non-asphaltic road base composed of aggregate mixed with a pozzolanic material which increases the bearing strength of the material.

(o) *Transportation construction projects*—these activities relate to the construction of roads and highways and include bases, sub bases, road surfaces, bridges, abutments, shoulders, and embankments. They are not related to any residential use.

(p) *Tri-State Mining District*—the lead-zinc mining areas of Ottawa County, Oklahoma, Cherokee County of southeast Kansas and Jasper, Newton, Lawrence, and Barry Counties of southwest Missouri.

(q) *Warm mix asphalt*—refers to a mixture of an asphalt binder with aggregate, paraffin or esterfied wax, and mineral additives that allow its use at temperatures much lower than hot mix asphalt.

§ 278.2 Applicability.

These requirements apply to chat from the Tri-State Mining District used in transportation construction projects carried out, in whole or in part, using Federal funds.

§ 278.3 Criteria for use of chat in Federally funded transportation projects.

Chat can be used in transportation construction projects carried out, in whole or in part, using Federal funds if:

(a) The chat is used in hot, warm or cold mix asphalt, in slurry seal, microsurfacing, or in epoxy seal; or

(b) The chat is used in Portland cement concrete, granular road base, flowable fill, stabilized road base or chip seal if, on a case by case basis either:

(1) Synthetic Precipitation Leaching Procedure (SPLP) tests are conducted on the proposed material using EPA SW–846 Method 1312, incorporated by reference in § 260.11 of this chapter, and the leachate testing results show that concentrations in the leachate do not exceed the National Primary Drinking Water Standards for lead and cadmium and the fresh water chronic National Recommended Water Quality Criterion for zinc of 120 µg/l; or

(2) EPA (or a State environmental Agency, if it chooses to do so) has determined, based on a site-specific risk assessment and after notice and opportunity for public comment, that the releases from the chat mixture in its proposed use will not cause an exceedance of the National Primary Drinking Water Standards for lead and cadmium in potential drinking water sources and the fresh water chronic National Recommended Water Quality Criterion for zinc of 120 µg/l in surface water; or

(c) The use of chat has been authorized pursuant to a State or Federal response action.

§ 278.4 Certification and recordkeeping requirements.

(a) *Certification.* For chat used under the jurisdiction of the U.S. Department of Interior, Bureau of Indian Affairs, the EPA certification below is not applicable. In other jurisdictions, the acquirer shall:

(1) Submit a signed, written certification to the environmental regulatory agency in the State where the chat is to be used within 30 days of the date of acquisition. The certification shall contain the following:

(i) Location of origin of the chat;

(ii) Amount of chat acquired; and

(iii) Certification Statement: I certify under penalty of law that the chat used in this transportation project will meet EPA criteria found in § 278.3.

(2) *Transfer.* If the chat is sold or otherwise transferred to another party, the acquirer shall provide a copy of the certification to the new owner of the chat. The new owner shall submit a certification according to paragraph (a)(1) of this section. The new certification supersedes all previous certifications.

(3) *Recordkeeping.* The acquirer of chat, and any other person that receives the chat, will maintain copies of all of the following for three years; a copy of the certification following transmittal to the State department(s) of the environment, and, as appropriate; any SPLP testing results; or any site-specific risk assessments.

(b) [Reserved]

[FR Doc. E7–13544 Filed 7–17–07; 8:45 am]

BILLING CODE 6560–50–P

Message

From: Sasseville, Sonya [Sasseville.Sonya@epa.gov]
Sent: 8/23/2017 9:03:33 PM
To: Brown, Byron [brown.byron@epa.gov]; Stachowiak, Robert [Stachowiak.Robert@epa.gov]
CC: Fotouhi, David [fotouhi.david@epa.gov]; Openchowski, Charles [openchowski.charles@epa.gov]; Johnson, Barnes [Johnson.Barnes@epa.gov]
Subject: RE: ISO support documents on mining risk
Attachments: Releases from HRM.PDF; Comprehensive Report.pdf; 108b HRM-Evidence of CERCLA Haz Substances and Potential Exposures final....pdf

Byron, here are the documents. Sorry for the delay.

From: Brown, Byron
Sent: Wednesday, August 23, 2017 4:52 PM
To: Sasseville, Sonya <Sasseville.Sonya@epa.gov>; Stachowiak, Robert <Stachowiak.Robert@epa.gov>
Cc: Fotouhi, David <fotouhi.david@epa.gov>; Openchowski, Charles <openchowski.charles@epa.gov>
Subject: RE: ISO support documents on mining risk

Hi Sonya – I just wanted to circle back on this and wanted to see if you or your staff have been able to track these down yet. I was out last week and am still catching up on emails, so apologies if I missed these. Thanks.

From: Sasseville, Sonya
Sent: Thursday, August 10, 2017 2:41 PM
To: Stachowiak, Robert <Stachowiak.Robert@epa.gov>
Cc: Brown, Byron <brown.byron@epa.gov>; Fotouhi, David <fotouhi.david@epa.gov>; Openchowski, Charles <openchowski.charles@epa.gov>
Subject: RE: ISO support documents on mining risk

OK, we'll get the documents together and send to all.

From: Stachowiak, Robert
Sent: Thursday, August 10, 2017 10:57 AM
To: Sasseville, Sonya <Sasseville.Sonya@epa.gov>
Cc: Brown, Byron <brown.byron@epa.gov>; Fotouhi, David <fotouhi.david@epa.gov>; Openchowski, Charles <openchowski.charles@epa.gov>
Subject: ISO support documents on mining risk

Hi Sonya –

Byron contacted me last night, seeking the key support documents relating to the "Continuing Risk at Hardrock Mining Facilities" section of the 108(b) preamble. 82 FR 3470-80. In particular, I was thinking of:

> Memorandum to the Record: Releases from Hard Rock Mining Facilities, Nov. 2016
>
> Draft Comprehensive Report: An Overview of Practices at Hardrock Mining and Mineral Processing Facilities and Related Releases of CERCLA Hazardous Substances, Nov. 2016
>
> EPA's analysis of 319 hardrock mining sites [I don't have a title for this analysis, which is discussed on p. 3478]

Because ORCR is the keeper of the record for the HRM proposal, I expect you will be in the best position to provide all of the right reports to him, in case there are alternatives or others as well. Can you help?

Thanks,
Rob S.

November 30, 2016

Comprehensive Report: An Overview of Practices at Hardrock Mining and Mineral Processing Facilities and Related Releases of CERCLA Hazardous Substances

Final Report

Table of Contents

List of Acronyms

Acronym	Definition
ACGP	Alaska Construction General Permit
ADEC	Alaska Department of Environmental Conservation
ADEQ	Arizona Department of Environmental Quality
ADNR	Alaska Department of Natural Resources
ADWR	Arizona Department of Water Resources
AMD	Acid Mine Drainage
AMLRA	Arizona Mined Land Reclamation Act
APDES	Alaska Pollutant Discharge Elimination System
APMA	Application for Permits to Mine in Alaska
APP	Aquifer Protection Permit
ARAP	Aquatic Resource Alteration Permit
ATCM	Airborne Toxics Control Measure
ATSDR	Agency for Toxic Substances and Disease Registry
AWQS	Arizona Water Quality Standards
AZPDES	Arizona Pollutant Discharge Elimination System
BLM	Bureau of Land Management
BR	Biennial Report
BRS	Biennial Reporting System
CAA	Clean Air Act
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation and Liability Information System
CWA	Clean Water Act
DCHD	Douglas County Health Department
DEQ	Department of Environmental Quality
DMRs	Discharge monitoring reports

DOE	Department of Energy
DOI	U.S. Department of the Interior
DPNR	Department of Planning and Natural Resources
DRI	Developments of Regional Impact
EAW	Environmental Assessment Worksheet
ECHO	Enforcement and Compliance History Online
EIS	Environmental Impact Statement
ELGs	Effluent Limitation Guidelines
EPA	U.S. Environmental Protection Agency
ERNS	Emergency Response Notification System
ERP	Environmental Resource Permit
FDEP	Florida Department of Environmental Protection
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FRS	Facility Registry System
HDPE	High Density Polyethylene
HRM/P	Hard Rock Mining and Processing
ICIS	Integrated Compliance Information System
IDEM	Indiana Department of Environmental Management
IDEQ	Idaho Department of Environmental Quality
IDL	Idaho Department of Lands
IDNR	Indiana Department of Natural Resources
ILO	International Labour Organization
ISL	In situ Leaching
IW	Industrial Wastewater
LDR	Land Disposal Restriction(s)
MACT	Maximum Achievable Control Technology
MANPHO	Mandatory Phosphate Program
MCLs	Maximum Contaminant Levels
MDEQ	Montana Department of Environmental Quality
MEPA	Minnesota Environmental Policy Act

MEPA	Montana Environmental Policy Act
MGWPCS	Montana Groundwater Pollution Control System
MIW	Mine-Influenced Water
MOU	Memorandum (or Memoranda) of Understanding
MPDES	Montana Pollutant Discharge Elimination System
MSHA	Mine Safety and Health Administration
MSSW	Management and Storage of Surface Waters Program
NAICS	North American Industry Classification System
NEI	National Emissions Inventory
NEPA	National Environmental Policy Act
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRC	Nuclear Regulatory Commission
NSPS	New Source Performance Standards
NV DEP	Nevada Department of Environmental Protection
NV DNR	Nevada Department of Natural Resources
ODEQ	Oklahoma Department of Environmental Quality
OFW	Outstanding Florida Waters
OSDH	Oklahoma State Department of Health
OU	Operable Unit
PCB	Polychlorinated biphenyl
pH	Measure of acidity
PVC	Polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
RDA	Residue Disposal Area
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RRC	Texas Railroad Commission
SCA	St. Croix Alumina

SDS	State Disposal System
SDWA	Safe Drinking Water Act
SMARA	Surface Mining and Reclamation Act
SMGB	Surface Mining and Geology Board
SO2	Sulfur Dioxide
SWPPP	Storm Water Pollution Prevention Plan
SX/EW	Solvent extraction and electrowinning
TAP	Toxic Air Pollutants
TCEQ	Texas Commission on Environmental Quality
TDEC	Tennessee Department of Environment & Conservation
TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Load
TPDES	Texas Pollutant Discharge Elimination System
TRI	Toxics Release Inventory
U.S.	United States
UIC	Underground Injection Control
UMTRCA	Uranium Mill Tailings Radiation Control Act
UPDES	Utah Pollution Discharge Elimination System
USACE	U.S. Army Corps of Engineer
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
UTS	Universal Treatment Standards
VMRP	Voluntary Mercury Reduction Program
WAD	Weak Acid Dissociable
WDRs	Water Discharge Requirements
WQS	Water Quality Standards
WRP	Wetland Resource Permit

Glossary

Acid mine drainage (AMD): a type of mine-influenced water and a major contaminant vector to surface and groundwater. When water is exposed to air and sulfide-bearing materials, forming solutions of net acidity and increasing the leaching and mobility of metals and trace elements. "Acid mine drainage" is sometimes referred to as "acid rock drainage" to clarify that acid in an environment may be generated by processes other than human mineral extraction and processing activities. Because this document deals with mining and milling practices, it will use acid mine drainage, henceforth AMD.

Adit: A horizontal passage leading into an underground mine for the purposes of access or drainage.

Beneficiation: preliminary processing such as grinding, gravity and magnetic concentration, flotation, and leaching that separate and concentrate minerals, such as in preparation for further refining, and does not generally result in a chemical change. Beneficiation involves the removal of uneconomic material from ore through physical and/or chemical methods to generate a product with a higher concentration of the valuable material and waste, called tailings. Exempt from regulation as a hazardous waste under RCRA Subtitle C.

CERCLA hazardous substances: elements, compounds, and hazardous wastes with statutory designation as hazardous substances under Section 102 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. For more information, see https://www.epa.gov/epcra/epcracerclacaa-ss112r-consolidated-list-lists-march-2015-version.

Contemporary mining: practices currently used and marked by technological sophistication and increased regulatory oversight. Technological advances allowed for more accurate characterization of unexploited ore bodies and more efficient processing, making lower grade economical to mine; an attendant increase in the number and size of mining operations that take advantage of economies of scale to increase their size while lowering their fixed costs (see below); an increasingly connected global economy which has led to a larger market for natural resources, multinational mining companies, and commodity cycles driven by the demands of developing countries' economies; and consideration for the potential deleterious social, economic, and environmental effects of mining operations, enforced by national and local regulatory regimes.

Dump leaching: involves the application of leach solution to uncrushed and otherwise unprocessed ore, directly from the mine. The dump leaching process can take up to two years to process a given ore pile and in some cases results in relatively low extraction rates. Because of its low cost, dump leaching is the most common leach method used for production of copper and is also used for nickel mining.

Economies of scale: the cost advantage from increased output. At larger mining operations, the per-unit fixed cost (e.g., of purchasing large machinery or investing in heap leaching pads) decreases because the costs are spread over a greater amount of product. Exploiting economies of scale makes lower grades of ore economical to mine.

Erosion: the moving of rock or other surface material by wind, rain, and other processes from one location to another. Mining can disturb large amounts of surface material and contribute to mine-influenced water, sedimentation, and other water quality problems.

Extraction: the process by which an operator removes valuable minerals from the ground, often requiring the removal of waste products (overburden and waste rock) at the same time. The extraction methods considered in this report are open pit mining, underground mining, and non-entry (in situ) mining.

Federal surface management regulations: the Bureau of Land Management (under 43 CFR Subpart 3809) and the United States Forest Service (under 36 CFR Part 228) permit and oversee mining activities on public federal lands. These agencies are charged with preventing "unnecessary and undue degradation" to public lands, and generally require the submission and approval of plans of operation for proposed activities, including an environmental assessment and reclamation plans. Other requirements include proper disposal, concurrent reclamation, and providing for post-mining monitoring, maintenance, and treatment.

Fugitive dust: particulate matter suspended in the air by wind action and human activities, such as extraction and milling. Because the dust may contain metals or chemical residues, human health and environmental problems may arise through direct inhalation, soil and plant deposition, or accumulation within a water body.

Heap leaching: the beneficiation process in which ore is placed on a leach pad on an impermeable barrier, leach solution is applied using sprinklers or misters, and the pregnant solution containing the liberated mineral of interest is collected. Due to cost efficiencies, heap leaching is typically used for treatment of low-grade oxidized ores.

Lixiviant: the solution used to extract minerals from ore in heap, dump leaching, and in situ leaching. The lixiviant captures the desired mineral when it comes in contact with the ore, then is transported to a separate processing stage where the mineral is pulled out of the lixiviant (for example, through ion exchange). Lixiviants can be reused.

Milling: the facility at which beneficiation, or processing, takes place. It usually includes equipment used for processing itself, and is connected to supplementary features that support processing: process ponds that house process liquid before use or reuse, tailings facilities that store processing waste, and transportation facilities to receive unprocessed ore and ship out processed concentrates.

Mine-influenced water (MIW): MIW encompasses any water whose chemical composition has been affected by mining or mineral processing. One type of MIW is AMD, but MIW also includes drainage that is neutral or alkaline. In addition to environmental concerns posed by acidity or alkalinity, MIW often contains elevated concentrations of mobilized contaminants, suspended solids, or sulfate or arsenate content.

Placer mining: Placer mining uses water to excavate, transport, and/or concentrate minerals from placer or alluvial deposits, where erosion and deposition have created deposits of minerals within sediments or rock fragments. This type of mining has been used predominantly for gold prospecting over the years, but has also been used for the recovery of platinum, silver, and heavy mineral sands containing tin, titanium, zircon, rare earths, or iron.

Point source: discharge from a discernible, confined and discrete conveyance. These discharges are regulated by NPDES permitting and other requirements under the Clean Water Act. Seepage to groundwater is not considered a point source, and is not regulated under the Clean Water Act. The classification of point and nonpoint discharges from mining operations has evolved over time.

Pregnant solution: a solution containing dissolved extractable mineral that was leached from the ore.

Primary processing: generally occurs after beneficiation and transforms concentrated mineral particles into a more useful chemical form, such as by heat (e.g., smelting) or chemical reactions.

Reagent: a substance added to a process to facilitate a desired chemical reaction, such as to liberate minerals from ore in leaching or flotation.

Overburden: non-mineralized material on top of ore deposits that must be removed in order to reach ore deposits. Typically stored on site and can be used for backfill and revegetation after mining operations are complete. The term may also be used to refer to waste rock, although overburden typically has a lower potential for environmental contamination. It is distinct from tailings, which remain after economically valuable components have been removed.

Reclamation and closure: refers to tasks conducted after mining operations have concluded to return the facility site to public use, and to ensure there are no post-operational releases. Tasks include monitoring the site, conducting water treatment if necessary, and covering and revegetating features that had created a surface disturbance, among others. Reclamation and closure is regulated under both federal surface management regulations (on federal land) and state regulations.

Seepage: the continuous release of fluid (e.g., from a tailings storage facility) into local soil, bedrock, or groundwater.

Tailings: the waste material created when valuable minerals or metals have been physically or chemically separated from ore. All beneficiation procedures generate tailings, in addition to mineral processing activities. Tailings usually take the form of a slurry (e.g., wet tailings), but

may also undergo dewatering and disposal as paste or filtered tailings. Depending on the commodity and the beneficiation process, tailings may contain a variety of hazardous substances.

Tailings storage facility: general term that includes “ponds,” “impoundments,” and “dams.” Many different types of facilities are used to contain and manage the tailings (waste ore) resulting from hardrock mining. Depending on the type of tailing (e.g., slurry, filtered, or paste), facilities may include liners, tailings ponds, and retention dams.

Trace elements: any element present in a substance in low concentrations, such as contaminants in mine-influenced water. Includes metals (e.g., gold, mercury), metalloids (e.g., arsenic), and nonmetals (e.g., sulfur).

Waste rock: material surrounding or within ore deposits that contains minerals in concentrations considered too low to be extracted at a profit. Its geochemistry may contribute to mine-influenced water. Typically stored on-site, sometimes co-disposed with tailings.

Introduction

Section 108(b) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, establishes certain regulatory authorities concerning financial responsibility requirements. Specifically, the statutory language addresses the promulgation of regulations that require classes of facilities to establish and maintain evidence of financial responsibility consistent with the degree and duration of risk associated with the production, transportation, treatment, storage, or disposal of hazardous substances. On July 28, 2009, the U.S. Environmental Protection Agency (EPA) identified hardrock mining facilities (i.e., extraction, beneficiation, and processing of ores and nonmetallic minerals) as the initial class of facilities that will be subject to financial assurance requirements under CERCLA 108(b) (74 FR 37213). Consequently, EPA is developing a proposed rule to apply financial assurance requirements for facilities within this class.

Public comments received in response to the 2009 proposed notice questioned the need for these requirements in light of existing environmental regulatory programs at both the state and federal levels, and considering the risk of future releases of hazardous substances from current mining operations. As part of EPA's consideration of financial assurance regulations for facilities within identified sectors, EPA is evaluating the validity of these assertions. This document endeavors to address that topic by investigating the extent to which the implementation of federal and state environmental regulatory programs and current hardrock mining and mineral processing practices have affected the non-permitted releases of hazardous substances into the environment. It also discusses how the nature and frequency of releases and other impacts may have changed over time.

This document first summarizes the methodology of this review and resulting conclusions. Each of the sections that follow describes the status of extraction, processing and waste management methods in the United States and provides a technical description of how they are implemented. Next, the potential sources of hazardous releases are described, as well as the regulatory framework in place to manage mining and processing practices. Finally, evidence from specific non-operating sites and currently operating facilities is presented in order to analyze the past and current non-permitted releases and their causes. Appendices include additional information on methodology and applicable regulations.

Methodology

The methodological approach focuses on several major extraction (mining), mineral processing, and waste management practices. Hardrock mining is the extraction of rock and other materials from the earth that contain a target metallic or non-fuel non-metallic mineral. The extraction processes include in situ solution mining, extraction of mineral-bearing groundwater brines, and surface or underground excavation of solid earthen materials. Mineral processing includes practices following the extraction of mineral ore that involve the separation and/or concentration

of metallic or non-fuel, non-metallic minerals from the ore, and to refine ores or mineral concentrates to extract a target material.

Initially, this research effort focused on characterizing practices within each commodity sector.[1] EPA concluded that a better approach was to focus specifically on mining, processing, and waste management practices that are commonly used within the U.S. hardrock mining industry, regardless of the commodity. Many processing practices, such as physical processing, flotation and leaching are applicable to many commodities. Several distinct waste management practices are also applicable to the majority of currently operating facilities. Furthermore, practices are more determinative of the hazards related to releases than the commodity, as specific process chemicals and methods are used in mining and mineral processing of multiple commodities. Although there are strong correlations between certain practices and commodities (e.g., Bayer processing for aluminum or ion exchange for uranium), those correlations are noted in the relevant practice papers.[2]

Each following section includes discussions of major extraction, mineral processing, or waste management practices. These practices include:

- Surface and Underground Mining
- Non-Entry (Solution) Mining
- Physical Processing, Gravity Processing, and Magnetic Processing
- Flotation
- Cyanidation
- Acid Leach, Solvent Extraction, and Electrowinning
- Pyrometallurgical Processes
- Bayer Process for Aluminum
- Mine-Influenced Water
- Waste Rock Piles
- Tailings Management

[1] EPA developed a list of hardrock commodities under consideration for this rulemaking. The list of 33 hardrock commodities excludes several commodities that are not expected to be mined or processed in the United States in the future based on USGS mineral profiles (e.g., arsenic, asbestos, columbium, gallium, mercury, and thorium). For more information, please see: U.S. Environmental Protection Agency, *Memorandum: Mining Classes Not Included in Identified Hardrock Mining Classes of Facilities* (Washington, DC: U.S. Government Publishing Office, 2009). Accessed at http://www.regulations.gov/contentStreamer?documentId=EPA-HQ-SFUND-2009-0265-0033&disposition=attachment&contentType=pdf.

[2] For example, gold and silver frequently co-occur in ore and can be extracted using cyanide leaching. For information regarding the common techniques for several commodities, see: U.S. Environmental Protection Agency, Office of Compliance, *Sector Notebook Project: Profile of the Metal Mining Industry* (Washington, DC: U.S. Government Publishing Office, 1995). Accessed 14 December 2015 at: https://www.epa.gov/sites/production/files/2015-05/documents/epa_metal_mining_sector_notebook.pdf

Each practice's subsection is structured similarly and discusses the following topics:

- Past and current use;
- Technical description;
- Potential sources and releases of CERCLA hazardous substances and management practices to address those potential sources and releases;
- Applicable state and federal regulations; and
- Documented releases at non-operating sites and currently operating facilities.[3]

For each practice, information was gathered through a literature review spanning technical references, academic sources, and government publications.[4] To the extent possible, historical methods were distinguished from contemporary techniques. The discussion of relevant regulatory frameworks for each practice drew upon prior EPA research of environmental regulations applicable to mining (see Appendix IV), supplemented by additional research to target each practice.

To develop a profile of past and contemporary practices and environmental releases of CERCLA hazardous substances associated with each practice, publicly available information was gathered for a sample of 29 non-operating hardrock mining and primary processing CERCLA sites, as

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[3] "Currently operating facilities" refers to facilities that have not formally entered closure as of July 2015, and includes all active, intermittent, or temporarily idled hardrock mining and mineral processing facilities. These facilities were identified using data from the Mine Safety and Health Administration, U.S. Geological Survey, and other public sources. EPA identified "non-operating" sites for this document by drawing upon mines and mineral processors that have undergone cleanup activities under CERCLA authority. In some cases, currently operating facilities may have portions that no longer have ongoing mining or processing activities, or portions designated as CERCLA cleanup sites. Throughout this document, EPA refers to "non-operating sites" as either those that were not identified as currently operating, or those where a portion of the mine or processing facility is no longer in use and has undergone CERCLA cleanup activities (e.g., legacy pits, ponds, or waste piles).

[4] Several references provided information used throughout this document. These include:

- U.S. Environmental Protection Agency, *Technical Resource Documents: Extraction and Beneficiation of Ores and Minerals* (Washington, DC: U.S. Government Publishing Office, 1994).
- U.S. Environmental Protection Agency, *Sector Notebook Project: Profile of the Nonferrous Metals Industry* (Washington, DC: U.S. Government Publishing Office, 1995). Accessed December 14, 2015, at: https://nepis.epa.gov/Exe/ZyPDF.cgi/50000FOZ.PDF?Dockey=50000FOZ.PDF
- U.S. Environmental Protection Agency, Office of Compliance, *Sector Notebook Project: Profile of the Metal Mining Industry* (Washington, DC: U.S. Government Publishing Office, 1995).
- National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002). Accessed August 2, 2015, at: http://www.nap.edu/catalog/10318/evolutionary-and-revolutionary-technologies-for-mining.
- J.J. Marcus, ed., *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining* (London: Imperial College Press, 1997).
- Peter Darling, ed., *SME Mining Engineering Handbook*, Third Edition (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volumes 1-2.

well as a sample of 70 currently operating facilities in the United States.[5,6,7] The sites and facilities examined represent stratified samples by primary commodity (see Appendices I and II). For some practices, additional non-operating sites and currently operating facilities are discussed to further illustrate the relevant issues. Information about non-operating sites was gathered largely from Record of Decision (ROD) and Remedial Investigation/Feasibility Study (RI/FS) documents. Information about currently operating sites came from various EPA databases, Emergency Response Notification System (ERNS) incident notifications, Mine Safety and Health Administration (MSHA) records, federal and state permit documents, and general research.

ERNS is used to store information on notifications of oil discharges and hazardous substances releases.[8] ERNS contains, in addition to other data, information about the material and the quantity released, where the release occurred, when the release occurred, and information about property damage, injuries, and deaths occurring due to the release. ERNS primarily contains initial accounts of releases reported to the National Response Center (NRC); exact incident details or follow-up actions may not be reported.

From the National Response Center (NRC) website, EPA aggregated reports for the period 1990-2014 and identified unique incidents involving CERCLA hazardous substances at hardrock mining facilities. Due to the nature of the reporting framework, these data do not include much information about continuous releases or information about releases after facility closure.

Review of individual site permits, environmental impact statements, and other documentation was outside of the scope of this report. Appendix III provides further discussion of the protocol used to gather information about non-operating sites and currently operating facilities. Where the protocol did not result in significant information, consultation with mining experts also informed the search for case studies.

This document does *not* endeavor to develop a formal risk assessment of the non-operating and currently operating sites and facilities. This effort also does not endeavor to evaluate past actions at the historical cleanup sites. Systematic and comprehensive information about facility

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[5] The sample of currently operating facilities relied on a list generated on November 18, 2014. Additional research into the facilities in the sample may have uncovered that some of them stopped operating or have temporarily suspended their activity. Where applicable, this document notes such instances. However, no effort was made to continuously review the operational status of the facilities.

[6] All references to "facilities" discuss currently operating facilities, while "sites" refer to non-operating sites. All references to "sites" and "facilities" cover both hardrock mining and mineral processing sectors.

[7] For a complete list of the sample non-operating sites and currently operating facilities, see Appendix III.A. and III.B

[8] The types of release reports that are available in ERNS fall into three major categories: substances designated as hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended; oil and petroleum products, as defined by the Clean Water Act of 1972 (CWA), as amended by the Oil Pollution Act of 1990; and all other types of materials. Because CERCLA defines hazardous substances to include CWA hazardous substances and toxic pollutants, the Clean Air Act hazardous air pollutants, the Resource Conservation and Recovery Act (RCRA) hazardous wastes, and the Toxic Substances Control Act imminently hazardous chemical substances, releases of these substances are also subject to CERCLA reporting requirements.

characteristics, waste management, releases, and regulatory oversight was not available for either non-operating sites or currently operating facilities. Thus, this profile is based on information that may be incomplete or anecdotal. For example, ROD, RI/FS, and permit documents provide narrative information; the absence of discussion of certain processes, activities, or occurrences cannot be taken as evidence of the fact that they did not take place.

The analysis conducted represents a general assessment of the occurrence of releases, and is also subject to the following data limitations:

- **Data Availability:** A range of publicly available CERCLA documents contained information about releases from the sample of non-operating sites. Documentation about operations and releases at currently operating facilities was inherently more difficult to find, absent major enforcement actions.
- **Magnitude and Severity of Releases:** This review did not attempt to characterize the environmental or human health risks associated with specific releases. No comparison of magnitude and severity was drawn between releases at non-operating sites and currently operating facilities.
- **Legacy Contamination:** Many sites and facilities within the non-operating and currently operating samples have been active for a century or longer. When a post-1980 release occurred at these facilities, it was difficult to determine if the equipment or practice responsible for the release was newly constructed or part of the site's past operations.

Certain drafts of practices discussed in Sections 1 and 2 of this document have undergone limited peer review by U.S. Geological Survey (USGS) staff and an independent mining expert.

Conclusions

The research effort yielded several insights concerning the extent to which the implementation of federal and state environmental regulatory programs, along with current mineral extraction, beneficiation, and processing practices in the United States, have affected the releases of hazardous substances into the environment. Overall, the review of regulations, practices, and past and current releases showed that despite changes in regulations and practices, the release of CERCLA hazardous substances as a result of mining and mineral processing activities is an ongoing issue across varying industry management practices. Extraction practices generally do not involve the use of hazardous chemicals, with the exception of non-entry mining. Nonetheless, releases resulting from surface and underground disturbances do occur. The potential harm related to each respective processing practice depends upon the nature of the chemicals the process uses. Waste management, i.e., generation, transportation, treatment, storage, and disposal, are practices with overarching concerns.

Past Experience

EPA has determined that 102 non-operating CERCLA sites that have ceased mining and mineral processing activities, including sites on the National Priorities List (NPL) and sites at which removal actions occurred, experienced releases resulting from industrial activity in the hardrock mining and primary processing sectors. From these 102 sites, EPA selected a sample of 29 sites for additional data collection to characterize the practices and releases that led to the CERCLA listing. In most of these cases, tailings management contributed to releases. Other non-tailings releases resulted from exposed pits or adits, waste rock piles, leaching solutions, Bayer refining, flotation, and smelting processes. In many cases, releases were largely due to the direct discharge of wastes into the local environment, minimal containment efforts, or operator bankruptcy and abandonment. Additionally, most releases described in publicly available information occurred after closure of the mine or processing site, suggesting that the potential for releases and adequate monitoring remains a long-term issue after closure.

Contemporary Experience

Federal and state authorities, including EPA, Bureau of Land Management (BLM) and states, promulgated modern environmental regulations applicable to hardrock mining and primary processing operations throughout the 1970s, 1980s and 1990s. During this period, incremental requirements and applicability standards continued to bring hardrock mining and mineral processing operations into the period of contemporary mining.[9] Regulations under the Clean Water Act (CWA), for example, introduced waste management regulations and sought to end direct discharges into waterways, and federal and state reclamation requirements have sought to prevent operator abandonment.[10] In addition, mining and mineral processing facilities produce wastes regulated under both Subtitle C and D of the Resource Conservation and Recovery Act (RCRA).

Technological developments have resulted in a wide range of management strategies to prevent or mitigate environmental releases. The use of these engineering controls depends on the existing regulatory requirements, and factors such as operator sophistication and economics.[11,12] Also during the early to mid-20th century, a combination of economic and technological factors increased the amount of surface disturbance and waste generation relative to the scale of mining

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[9] This document uses the phrase "contemporary mining" to describe contemporary mining practices marked by technological sophistication and increased regulatory oversight.

[10] U.S. Environmental Protection Agency Region 10, *EPA and Hardrock Mining: A Source Book for Industry in the Northwest and Alaska* (Washington, DC: U.S. Government Publishing Office, 2003). Accessed November 7, 2015, at: http://yosemite.epa.gov/R10/WATER.NSF/Sole+Source+Aquifers/hardrockmining.

[11] G. Hilson and B. Murck, "Progress toward pollution prevention and waste minimization in the North American gold mining industry," *Journal of Cleaner Production* 9 (2001), p. 405-415.

[12] G. Hilson, "Pollution prevention and cleaner production in the mining industry: an analysis of current issues," *Journal of Cleaner Production* 8 (2000), p. 119-126.

activities.[13] For example, cyanide heap leaching, which was developed relatively recently, exploits economies of scale to process low-grade ore.[14] The corresponding amount of waste rock and tailings being mined and deposited at a single site as a result of large-scale mining operations is increasing.[15] In turn, the environmental impact of mining and processing operations may be particularly high at larger facilities. For example, EPA found that in 2007, two percent of the estimated 294 mines with NPDES permits generated approximately 90 percent of the industry's discharges, accounting for pollutant toxicity.[16]

At least 52 mines and processors in the sample of currently operating facilities experienced permits exceedances, spills, seepages, fugitive dust, or other releases while using contemporary mining and processing practices. Releases occurred in the 1980s, 1990s, and after 2000. Similar to past releases, tailings management has continued to play a role in roughly half of the publicly documented releases. Releases occurred at both old and newly constructed tailings facilities. The review of mining and processing practices revealed the following concerns related to each practice:

- The environmental impacts of large mining operations, particularly surface mines, may include surface disturbances, fugitive dust, and contaminated mine waters from exposed mine walls and waste piles. Open pits and underground adits were the cause or the site of releases at a minimum of nine mining operations since 1980 in EPA's review.
- Despite no physical extraction of rock, non-entry mining can introduce hazardous contaminants into the environment. The threats are releases to adjacent groundwater and to surface soils and surface water from spills. Non-entry mining and related practices were responsible for 56 releases at two currently operating facilities.
- The primary environmental concerns associated with physical processing are the generation of fugitive dust and tailings, which can result in discharges to the environment. EPA's review revealed that at least four operations experienced continuous releases as a result of tailings from physical processing.
- Flotation processes may release flotation solution as well as tailings into the local environment, whose environmental risk profile is determined by their chemical

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[13] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[14] John Marsden, and Iain House, *The Chemistry of Gold Extraction*, Second Edition (Englewood, CO: Society for Mining, Metallurgy and Exploration, 2006).

[15] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[16] U.S. Environmental Protection Agency, *Ore Mining and Dressing Preliminary Study Report*, EPA-820-R-10-025 (Washington DC, October 2011).

composition. Flotation contributed to releases at four operations since 1980 in EPA's review.

- In addition to the release of cyanide, discharges from cyanidation processes both during operations and after closure can also contain toxic elements. EPA found that cyanidation processes led to releases at 10 operations since 1980 in its review.
- Acid leach involves the use of sulfuric acid solutions. In addition to the threat sulfuric acid poses as a hazardous substance, the acid can mobilize other contaminants from surrounding material. EPA's review associated acid leaching with environmental releases at six operations since 1980.
- A major environmental concern with pyrometallurgical processes includes the release of sulfur dioxide and particulate matter containing lead, arsenic, and other airborne pollutants. Since 1980, six operations have experienced releases from roasting, smelting, and refining.
- The major environmental concern associated with the Bayer process is red mud, which can contain arsenic, chromium, and radium-226. Pyrometallurgical processing was responsible for releases at three facilities since 1980, according to EPA's review.

Most of these processes generate waste rock and/or tailings, with the exception of non-entry mining and pyrometallurgical processing. The disposal of waste rock and tailings requires long-term management and monitoring because of the potential for continued releases after facility closure. Of particular concern for waste management practices is the generation of mine-influenced water (MIW). MIW can contain process chemicals and additional mobilized contaminants.

No matter the extraction, processing, or waste management practice, facilities must transport, store, and dispose of material in the course of operations, e.g., through pipes and in ponds. Transportation and storage can result in releases due to leaks, seepage and spills. Pipe failure is a common source of release among currently operating facilities, although it did not lead to any Superfund sites in the non-operating sample. Process ponds contributed to releases in both the currently operating and non-operating samples, generally through seepage.

In addition to mining and processing activities, operator bankruptcy and abandonment were also associated with releases.[17] Commodity cycles affect the financial health of mine and processing

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[17] These findings reflect anecdotal evidence of the contributing factors to releases. In a literature review, no systematic reviews studied operator financial health in the hardrock mining sector and the creation of CERCLA liabilities. More broadly, however, studies have suggested that, in mining and in other industries, business owners respond to declining prices and profitability by cutting costs, thereby increasing the potential for accidents and environmental risk. The prices of gold, copper, and iron ore have demonstrated volatility in recent years. Price volatility increases the likelihood at any given time that mine operators may have to cut cost to respond to decreased profitability. For the connection between profitability and environmental performance in the gold mining industry, see Bruce Finnie, Jeffrey Stuart, Linda Gibson, and Fern Zabriskie, "Balancing Environmental and Industry Sustainability: A Case Study of the US Gold Mining Industry," *Journal of Environmental Management* 90 (2009): 3690-3699, p. 3692. For recent volatility of commodity prices, see Federal Reserve Economic Data, Federal Reserve Bank of St. Louis. Accessible at: https://fred.stlouisfed.org/.

facility owners/operators, which in turn may affect the environmental performance and likelihood of bankruptcy and abandonment.[18,19] This pattern can be especially relevant for smaller mining companies with relatively limited resources.[20]

The incidents from EPA's review related to all of the extraction, processing, and waste deposition practices described in this document. In these incidents, all of the practices either resulted in releases or contributed to increasing the volume or environmental harm of a release, or both. The effects of these releases ranged from minimal impacts with no known long-term effects to significant impairment to groundwater, surface waters, and air quality. Observed releases affected local wildlife, plants, and human populations. They varied in scale from sudden, catastrophic releases to continuous seepage into the local environment over the course of years and decades. The releases also occurred in the presence of engineering controls and mitigation strategies.

For more information on releases related to each practice, see the relevant chapters, below.

Limitations

A number of factors limited the inferences that can be drawn from data about releases at currently operating facilities:

- **Compliance:** Although environmental regulations establish a set of minimum standards, compliance with those regulations may not be fully achieved by individual facilities, making it difficult to determine actual practices. As described previously, even in the event of full compliance with the existing regulatory framework, the owner/operator of the facilities may not be following all available management practices designed to prevent and mitigate releases. The management practices described in the following sections represent available options rather than standard or required controls.

- **Permitted Releases:** Before the establishment of the current regulatory framework, all releases – even direct discharge of toxic material into the local environment – did not constitute illegal discharges. However, due to data limitations, the review of contemporary facilities considered only unpermitted releases or permit exceedances.

- **Releases after the Operation Period:** Releases occur during the post-closure and post-reclamation phases, which currently operating facilities have not yet reached.

- **Case Study Limitations:** The evaluation of past operations was drawn from CERCLA sites. Similarly, the review of currently operating facilities focused on case studies of

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[18] D. Laurence, "Establishing a sustainable mining operation: an overview," *Journal of Cleaner Production* 19 (2011), p.278-284.

[19] J.A. Brierley and C.L. Brierley, "Present and future commercial applications of biohydrometallurgy," *Hydrometallurgy* 59 (2001), p. 233-239.

[20] G. Hilson and B. Murck, "Progress toward pollution prevention and waste minimization in the North American gold mining industry," *Journal of Cleaner Production* 9 (2001), p. 405-415.

ongoing releases. For all sites and facilities, the review relied upon publicly available documents obtained online. No effort was made to obtain information in hard copy from state or local offices. Thus, the data for any mine or processor may not be complete, and this document does not attempt to characterize the statistical probability of releases in the overall hardrock mining and mineral processing universe.

Section 1: Current Mining and Mineral Practices

A. Surface and Underground Mining

B. Non-Entry (Solution) Mining and Ion Exchange Processing

C. Physical Processing, Gravity Processing, and Magnetic Processing

D. Flotation Processing

E. Cyanidation

F. Acid Leach, Solvent Extraction, and Electrowinning

G. Pyrometallurgical Processes

H. Bayer Process for Aluminum

A. Surface and Underground Extraction

Introduction

Mining is the process of extracting valuable minerals from their geologic source prior to beneficiation. The extraction of material from the earth during mining can be broadly divided into three categories: surface (open-pit) mining, underground mining, and solution mining (such as in situ leaching [ISL] or brine extraction). This document describes surface and underground mining, which are conventional mining methods that entail drilling, blasting, and/or removing earth or rock.

The environmental impacts of large mining operations, particularly surface mines, may include surface disturbances, fugitive dust, and contaminated mine drainage from exposed mine walls and waste piles.[21] At contemporary mines, economies of scale have favored surface mines, with a trend towards larger operations. As a result, the corresponding amount of overburden, waste rock, and tailings being mined and deposited at a single site is also generally increasing. Several sources, however, describe a renewed interest in underground mining as the availability of amenable near-surface deposits becomes exhausted.

While waste rock and other extraction wastes are generally exempted from the hazardous waste-management requirements of RCRA Subtitle C, federal and state mining programs contain requirements for how surface and underground mines should be reclaimed during and after operations. Moreover, the requirements vary greatly across states and specific operations. The CWA and delegated state programs also lay out requirements for water quality from mine drainage.

A review of non-operating CERCLA sites suggested that releases can occur during operations, as well as post-closure.

Past and Current Use

Historically, most metal ore extraction in the United States used underground mining; however, cost and the development of other technology have made it a less common extraction method. From the 1990s to the year 2000, the types of mines worldwide transitioned from 90 percent underground to 85 percent open-pit operations.[22] In the United States, surface mines produced approximately 97 percent of all non-coal ores by tonnage in 2007, with underground mines

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[21] The main extraction wastes are overburden and waste rock; waste rock disposal is considered in Section 2.B. Tailings are waste from ore processing; disposal is considered in Section 2.C.

[22] M. Randolph, "Chapter 1.2.: Current Trends in Mining," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 1.

producing three percent of non-coal ores.[23] For metal ores specifically, surface mines produced almost 99 percent of ores, by tonnage.[24]

In metal mining, mergers and acquisitions have resulted in fewer operating companies, increased foreign ownership, and fewer and larger facilities.[25] The corresponding amount of waste rock and tailings being mined and deposited at a single site as a result of large-scale mining operations is also increasing. For example, large open-pit copper mines in the United States can generate up to a million tons of waste and ore daily, for decades.[26]

Currently, the industry is beginning to face engineering and economic constraints for size and depth of open-pit operations. Several sources describe a renewed interest in underground mining for this reason.[27] Some ore deposits may only be mined economically by underground mining methods. These deposits typically are deeper, and have geological features that require more targeted extraction methods.[28]

Technical Description

Both surface and underground mining generally entail drilling, blasting, and removing earth or rock. Economic factors, (e.g., commodity prices and production costs) and technical factors (e.g., the size, orientation, and geology of deposits) determine the extraction method used.[29]

In surface mining, commonly referred to as "open-pit mining," operators use heavy equipment to remove overburden materials that lie on top of ore deposits, e.g., non-valuable rock, soil, or surface features. After these overburden materials are removed, the ore deposits are extracted.

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[23] Michael Nelson, "Chapter 6.1.: Evaluation of Mining Methods and Systems," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 1.

[24] Michael Nelson, "Chapter 6.1.: Evaluation of Mining Methods and Systems," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 1.

[25] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[26] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[27] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002); M. Randolph. "Chapter 1.2.: Current Trends in Mining," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 1, Volume 1; Steve Fiscor, "Major Open-Pit Copper Mines Move Underground." *Engineering and Mining Journal* (8 June 2010). Accessed October 9, 2015, at: http://www.e-mj.com/features/409-major-open-pit-copper-mines-move-underground.html#.VPDnDnzF9KI.

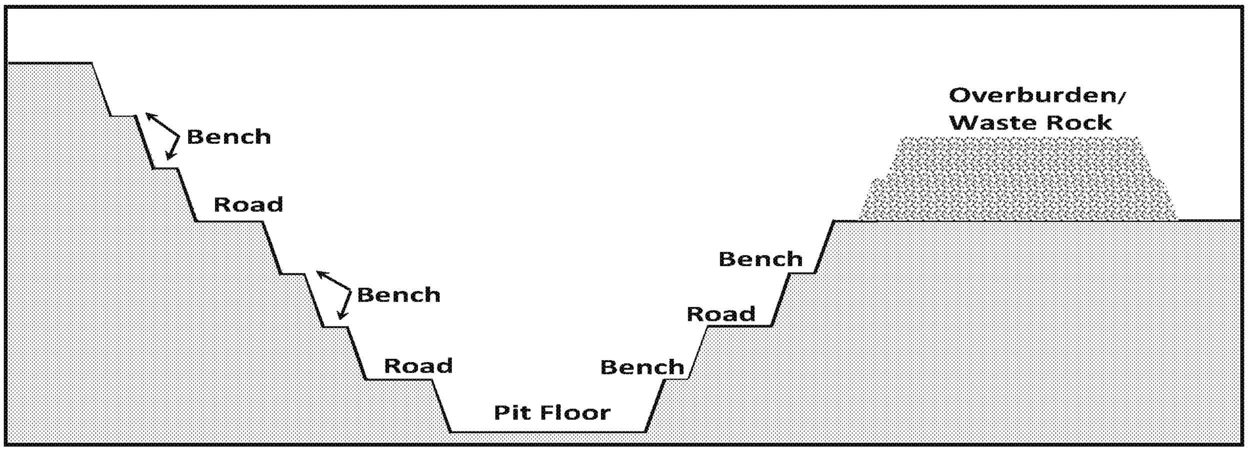
[28] Michael Nelson, "Chapter 6.1: Evaluation of Mining Methods and Systems," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 1.

[29] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

Waste rock, which contains minerals at too low a concentration to be extracted profitably, may surround or be within the ore deposit, and is also removed. Generally, the geochemical properties of waste rock present additional environmental considerations for waste management.

Surface mining cuts one or more horizontal benches to extract the ore while dumping overburden and waste rock at dedicated disposal sites outside the final pit boundary.[30] Exhibit 1.A.1. shows a typical open-pit mine configuration. At some surface mines, the disposal of mine and processing wastes may occur in another area of an open pit, or in a dedicated storage facility on-site.[31] Less commonly, waste is used to backfill an already mined pit.[32]

Exhibit 1.A.1. Configuration of a Surface (Open-Pit) Mine



Underground mining methods are used when deposits occur deep beneath the earth's surface. Hardrock mines conducting underground operations commonly use nitrogen-based explosives to dislodge ore and waste. To reach the ore body, remove ore and waste, and provide ventilation, miners must excavate either a vertical shaft, a horizontal passageway (adit), or an inclined passageway.[33] Blasted ore is hauled away by trains, loaders, or trucks that either bring it directly to the surface, or transport it to a shaft where it is hoisted to the surface and sent to a crushing facility.

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[30] Andrew Wetherelt and Klass Peter van der Wielen, "Chapter 10.1: Introduction to Open Pit Mining," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011).

[31] Andrew Wetherelt and Klass Peter van der Wielen, "Chapter 10.1: Introduction to Open Pit Mining," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011).

[32] Andrew Wetherelt and Klass Peter van der Wielen, "Chapter 10.1: Introduction to Open Pit Mining," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011).

[33] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

Because of economies of scale, large-scale surface mining techniques typically offer more efficient, productive, and safe ore recovery than underground methods, but require deposits to be relatively close to the surface and have uniform ore distribution.[34] On the other hand, deeper, less continuous deposits can only be mined economically by underground methods, which can target pockets of minerals more selectively. Underground mining may also be utilized if mining sites are subject to surface use restrictions.[35] Compared to surface mining, underground extraction operations require the pre-production installation of a great deal of infrastructure, in turn necessitating more careful planning and a larger initial capital investment.[36]

Potential Sources of Hazardous Substances

Both types of mining create large amounts of excavated material, with surface mining tending to generate greater amounts of waste rock. Surface mines generate dust, large piles of waste rock, and large, usually permanent holes in the earth's surface. Dust and waste rock – produced during both open-pit and underground mining – can release trace elements and other toxic substances. Waste rock and overburden piles are typically stored on-site, which may result in acid mine drainage (AMD)[37] or other MIW if exposed to stormwater, surface water or groundwater.[38] Exhibit 1.A.2. describes these causes of potential releases and management methods in more detail.

Because of the trend towards fewer and larger facilities, the environmental impact of mining and processing operations may also be concentrated. For example, EPA found that in 2007, two percent of the estimated 294 mines with NPDES permits generated approximately 90 percent of the industry's discharges, accounting for pollutant toxicity.[39]

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[34] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[35] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[36] Nelson, "Chapter 6.1: Evaluation of Mining Methods and Systems," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011).

[37] "Acid mine drainage" is sometimes referred to as "acid rock drainage" to clarify that acid in an environment may be generated by processes other than human mineral extraction and processing activities. Because this document deals with mining and milling practices, it will use acid mine drainage, henceforth AMD.

[38] Tailings and other spent ore may also contribute to water contamination. These waste products of beneficiation and processing are discussed in Section 2.C.

[39] U.S. Environmental Protection Agency, *Ore Mining and Dressing Preliminary Study Report* , EPA-820-R-10-025 (Washington DC, October 2011).

Exhibit 1.A.2. Potential Releases Associated with Surface and Underground Extraction Methods

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
Topographical impacts	Surface mines can result in significant alterations of natural landscapes and sometimes generate large piles of waste rock and typically permanent holes in the earth's surface. Subsidence from underground mining can result in the collapse of the overlying surface topography and pronounced changes at the surface.[40]	During design and planning phase, targeted extraction techniques such as selective mining and avoidance could be used to minimize topographic impacts.[41] While active, special handling techniques such as backfilling at underground mines can minimize and/or prevent subsidence.[42] At closure, backfilling open-pit mines, in-pit co-disposal of tailings and waste rock with dry or wet covers,[43] and revegetation of the mining area can lessen or minimize topographical impacts.[44]
Fugitive dust	Extraction can release toxic substances normally bound in rock. Before processing, a large amount of waste material is separated from mineral ore and frequently stored on-site in waste rock piles or tailings storage facilities. This waste may also contain chemicals introduced during separation processes, such as cyanide leaching agents. As a result, fugitive dust emissions containing toxic air pollutants may be released from surface mining pits, from piles of waste rock and tailings, or from the transportation of ore and waste materials.[45] For example, at gold mines, beneficiation processes such as milling (crushing) and autoclaving, as well as refining processes can generate atmospheric mercury emissions.[46]	For worker health and safety reasons during operations surface and underground mines control dust in conformance with MSHA regulations that require a variety of both wet and/or dry methods to reduce fugitive dust. This includes dust control for drilling, equipment and conveyors, haul roads, and any other mine features where fugitive dust resulting in worker health and safety may be an issue.[47] At closure dry or wet covers can be used to lessen or minimize fugitive dust emissions from mines.[48]

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[40] F.K. Allgaier, ed., "Chapter 5: Environmental Effects of Mining," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997).

[41] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.1. Accessed December 4, 2015, at http://www.gardguide.com.

[42] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.3.1.

[43] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.3.7.

[44] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.6.

[45] Pramod Thakur, "Chapter 15.4: Evaluation of Mining Methods and Systems," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[46] G. Jones and G. Miller, *Final Report to EPA Region 9: Mercury and Modern Gold Mining in Nevada* (Washington, DC: U.S. Government Printing Office, 2005). Accessed January 13, 2015, at http://www.chem.unep.ch/mercury/Trade%20information/NRDC-NEVADABYPRODUCTRECOVERYREPORT.pdf.

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
	Coarse dust usually settles within a few hundred meters of the source. Smaller particle size fractions (PM10), however, can be carried by wind in dust clouds for great distances and may be deposited on or near populated areas. Because the dust may contain metals, human health and environmental problems may arise through direct inhalation, soil and plant deposition, or accumulation within a water body.	
Mine drainage – underground mines	Water flowing through underground mines can cause releases of mine water through mining openings.[49] Contact with exposed rock in mine shafts can transport contaminants and negatively impact soil and water quality. Mine water can have environmentally significant concentrations of metals and solids, elevated temperatures, and altered pH, depending on the nature of the ore body and local geochemical conditions. In addition, mine water can acidify over time as sulfide minerals are exposed to water and air, resulting in AMD. AMD, and MIW more generally, can cause significant threats to surface water and groundwater resources during active mining and for decades after operations cease.[50] For example, in 1993, the U.S. Forest Service (USFS) estimated that AMD impacted between five and ten thousand miles of domestic streams and rivers.[51] The need for costly water treatment can persist for decades after a mine has closed.[52] Depending on the hydrology of the site, the drainage may be discharged to groundwater or surface water. Acidic drainage also increases the leaching and mobility of some metals and trace elements.[53]	Grouting and other methods have been shown to be highly effective at reducing drainage from underground mines during operations.[54] Flooding can significantly block the flow of oxygen and prevent acid generation; however, soluble products can result in unacceptable water quality.[55] Seals can be used to create flooded conditions, however, if considerable hydraulic head is created rigorous engineering design is required.[56] Where discharges from underground mines result in unacceptable water quality conditions the mine discharge may be allowed to discharge naturally (e.g. out the mine portal) where it is captured and treated, or the discharge may be prevented by pumping the underground mine and maintaining the level. This technique is also used where underground mine discharges to groundwater require mitigation.[57] In the event the mine drainage requires treatment prior to discharge, either during operations or post-closure, a variety of active, passive and in situ mine drainage treatment techniques are potentially applicable.[58]

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[47] Fred N. Kissell, *Handbook for Dust Control in Mining*, No.2003-147 (Washington, DC: U.S. Department of Health and Human Services, National Institute for Occupational Safety and Health, 2003). Accessed 4 December 2015 at: http://www.cdc.gov/niosh/mining/UserFiles/works/pdfs/2003-147.pdf

[48] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.6.2.

[49] U.S. Environmental Protection Agency, DRAFT: *Mining Environmental Impact Statement Technical Report* (Washington, DC: U.S. Government Printing Office, 2013), p. 31.

[50] F.K. Allgaier, ed., "Chapter 5: Environmental Effects of Mining," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997).

[51] U.S. Environmental Protection Agency, Office of Compliance, *Sector Notebook Project: Profile of the Metal Mining Industry* (Washington, DC: U.S. Government Publishing Office, 1995).

[52] U.S. Environmental Protection Agency, Office of Compliance, *Sector Notebook Project: Profile of the Metal Mining Industry* (Washington, DC: U.S. Government Publishing Office, 1995).

[53] U.S. Environmental Protection Agency, Office of Solid Waste, Special Waste Branch, *Technical Resource Document: Extraction and Beneficiation of Ores and Minerals* EPA 530-R-94-013, Volume 2: Gold (Washington, DC: U.S. Government Printing Office, 1994). Accessed December, 2015, at: https://archive.epa.gov/epawaste/nonhaz/industrial/special/web/pdf/iron.pdf.

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
Mine drainage – open-pit mines	Open-pit mine highwalls are prone to high rates of erosion and mass wasting. The exposed rock on the pit walls and the overburden may result in AMD or other MIW, often forming "pit lakes". Similar to underground mines, MIW can have environmentally significant concentrations of metals, other contaminants, and sediments, elevated temperatures, and altered pH.	Passive mitigation methods: [59] • Revegetation • Pit backfill to reduce exposure to air and water. For example, burying waste rock or using overburden material as backfill can reduce acid generation substantially, under proper geologic conditions. • Prevention of pit lake formation (e.g., drainage and treatment systems) • Diversion channels and ditches prevent AMD by intercepting and conveying runoff from undisturbed areas around active mining sites. [60] • Natural or constructed hydrological systems, including wetlands, limestone drains, water covers, and naturally occurring geochemical or biological processes • Bioremediation processes treating mine wastewater using natural acidophilic microbes.[61] Active: • Treatment of mining wastewater and separation of solids[62,63] • Pit lake pump/treatment/neutralization

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[54] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.5.5.

[55] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.5.4.

[56] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.5.5.

[57] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 7.4, 4.2.2.2.

[58] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 7.5.

[59] R. Verburg, "Chapter 16.5: Mitigating Acid Rock Drainage," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[60] G. Hilson and B. Murck, "Progress toward pollution prevention and waste minimization in the North American gold mining industry," *Journal of Cleaner Production* 9 (2001), p. 405-415.

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
Mine drainage - Waste rock piles	The large quantities of overburden or waste rock material produced in surface or underground mining can be susceptible to weathering and leaching of contaminants resulting in discharge of hazardous materials. Waste rock produced from surface mines consists of non- mineralized and low-grade mineralized rock removed from above or within the ore body during extraction activities. Waste rock is typically disposed in large piles or dumps in close proximity and down-slope of the point of extraction. Regardless of the layout of the unit, waste rock dumps are generally constructed on unlined terrain, with underlying soils stripped, graded, or compacted depending on engineering considerations[64]	As part of mine design targeted extraction techniques such as selective mining and avoidance could be used to minimize mining of waste rock that could result in MIW.[65] As part of the waste rock disposal area design engineered barriers such as a liner can be utilized to collect seepage from waste rock resulting reduced seepage management requirements.[66] During operations special handling techniques such the addition of alkaline materials or amendments can be used to reduce potential for AMD.[67] At closure waste rock areas can be reclaimed using dry and wet covers to lessen or minimize discharges of MIW from waste rock piles. [68] In the event the mine drainage requires treatment prior to discharge, either during operations or post-closure, a variety of active, passive and in situ mine drainage treatment techniques are potentially applicable.[69]

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[61] D.B. Johnson, "Acidophilic Microbial Communities: Candidate for Bioremediation of Acidic Mine Effluents," *International Biodeterioration & Biodegradation* 35:13 (1995), p. 41-58; and T. Umita, "Biological mine drainage treatment." *Resources, Conservation and Recycling* 16 (1996), p.179-188; and United Nations. *1995 Industrial Commodity Statistics Yearbook - Production Statistics (1986-95)* (New York: United Nations, 1997).

[62] United Nations Environment Programme, United Nations Industrial Development Organization, and the World Bank Group, *Pollution Prevention and Abatement Handbook, Airborne Particulate Matter: Pollution Prevention and Control* (Washington DC: 1998), p. 235-239.

[63] G. Hilson,. "Barriers to Implementing Cleaner Technologies and Cleaner Production (CP) Practices in the Mining Industry: A Case Study of the Americas," *Minerals Engineering* 13:7 (2000), p. 699-717.

[64] A. Kent, “Waste Rock Disposal Design,” in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997).

[65] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.1.

[66] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.6.1.

[67] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.4.2.

[68] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.3.2.

[69] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 7.5.

During ongoing operations, drainage, diversion, and wastewater treatment techniques can help to mitigate mine drainage, which may contain contaminants. During reclamation and closure, replacing the overburden as backfill and revegetation of the area can restore landscape features, prevent erosion, and reduce the potential for further water quality issues. Various factors, including the size and sophistication of mining operations, variation in regulatory requirements, and economic conditions may influence the preventative measures adopted at each site.[70] For example, all types of mining operations use culverts to intercept and convey runoff under access roads, stockpile areas, and structures. Some sources suggest, however, that many mining operations commonly undersize culverts or install them at too flat a grade to effectively carry away runoff.[71] In a survey of North American gold mines, some larger mining companies also reported neutralizing acidic mine drainage with lime, while no smaller mining companies indicated doing so.[72]

State and Federal Regulations

While BLM and USFS oversee mining activities on federal land, state-level mining regulations in many states apply to extraction operations on both private and public lands. BLM has required reclamation of lands since 1987, and USFS has required reclamation since 1974. Many states also maintain Memoranda of Understanding (MOU) with the federal government to share responsibility for management of mining on public lands.

While these federal and state regulations establish frameworks for reclamation and prevention of water contamination, performance standards vary greatly in their specificity and stringency. For example, BLM guidance states that particular mining claims may require appropriate mitigation and reclamation measures in plans of operations given anticipated potential environmental impacts, but that generally BLM land use plans do not prohibit certain mining practices through "zoning."[73] Mines opened after 1978 are required to treat effluent water, although the required treatment period after mine closure may not be specified. As such, a facility can close in full environmental compliance, but acid drainage and other MIW may remain potential concerns for more than 50 years.[74] While some states mirror BLM's management guidance, Montana Code Part 3 (Metal Mine Reclamation) details specific reclamation actions at sites that must be conducted and prohibits certain mining practices. As a result, not all mines may conduct

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[70] G. Hilson and B. Murck, "Progress toward pollution prevention and waste minimization in the North American gold mining industry," *Journal of Cleaner Production* 9 (2001), p. 405-415.

[71] C.D. Lidstone and A. Korte, "Chapter 16.4: Water and Sediment Control Systems," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[72] G. Hilson and B. Murck, "Progress toward pollution prevention and waste minimization in the North American gold mining industry," *Journal of Cleaner Production* 9 (2001), p. 405-415.

[73] U.S. Department of the Interior, Bureau of Land Management, *Surface Management Handbook* H-3809-1 (Washington, DC: U.S. Government Printing Office, 2012), Section 8.7.1, p. 8-14.

[74] U.S. Environmental Protection Agency, Office of Compliance, *Sector Notebook Project: Profile of the Metal Mining Industry* (Washington, DC: U.S. Government Publishing Office, 1995).

backfilling, pit lake treatment, or revegetation, or conduct reclamation activities concurrent with present operations.

While BLM surface mining regulations have not defined more specific standards for mine operation, reclamation, and closure,[75] congressional bills that also strive to define narrower standards for reclamation and water quality were introduced in 2009 and 2014, but were not ratified.[76]

Federal Regulations

Federal agencies have promulgated rules for extraction operations under various statutes and regulations. These include:

- **Land Disposal:** RCRA Subtitle C excludes mining extraction wastes, including waste rock and overburden, from being regulated as hazardous waste at the federal level.[77] Mining wastes may be subject to RCRA Subtitle D solid waste disposal requirements, which are regulated by the states.
- **Surface Management:** The BLM and the USFS permit and oversee mining activities on public federal lands. These agencies are charged with preventing "unnecessary and undue degradation" to public lands, and generally require the submission and approval of plans of operation for proposed activities, including an environmental assessment and reclamation plans. Other requirements include proper disposal, concurrent reclamation, and providing for post-mining monitoring, maintenance, and treatment.

Under 36 CFR Part 228 regulations, mining operations on USFS land must minimize adverse environmental impacts, by following approved plans of operation and complying with applicable Federal and state laws. Reclamation must be conducted at the earliest practicable time or within one year of conclusion of operations.

- **Discharges to Water:** Under the CWA effluent limitation guidelines (ELGs) for ore mining and dressing, mine drainage is subject to water quality standards for total suspended solids, pH, and specific metals.[78] These regulations also specify technology-based standards, and sometimes require National Pollutant Discharge Elimination System (NPDES) permits for these operations to incorporate certain best management practices.

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[75] A.P. Morriss, R.E. Meiners, and A. Dorchak, "Between a Hard Rock and a Hard Place: Politics, Midnight Regulations, and Mining," *Administrative Law Review* 55:3 (2003), p.551-606.

[76] HR 699, S. 796 (2009); HR 5060 (2014).

[77] The Bevill Amendment, passed by Congress in 1980, excluded "solid waste from the extraction, beneficiation, and processing of ores and minerals" from regulation under RCRA Subtitle C.

[78] 40 CFR Volume 50 Subpart J Section 440. In light of recent Supreme Court cases regarding the scope of waters protected under the Clean Water Act, applicability is further clarified in the proposed rulemaking EPA and Army Corps of Engineers at 79 FR 22187, "Definition of 'Waters of the United States' Under the Clean Water Act," accessed at: https://www.federalregister.gov/articles/2014/04/21/2014-07142/definition-of-waters-of-the-united-states-under-the-clean-water-act.

Where ELGs may not apply, technology-based limits are developed during the facility-specific permitting process. The NPDES program applies to both active and inactive mines, as well as abandoned mines where legally responsible owners or operators of point sources can be identified.

Runoff from waste rock piles may be regulated under NPDES stormwater permits when it is not commingled with process water or mine drainage.[79,80] Stormwater permits regulate stormwater contaminated by contact with material from mining activities, primarily requiring site-specific pollution prevention planning and/or implementation of mitigation practices.[81] These include treatment requirements, operating procedures, practices to control runoff, and monitoring. These rules do not cover all potential sources of water pollution. Mining pits protected by cover do not qualify as point sources from a "discrete conveyance," and do not fall under point-source requirements under the CWA.[82]

While EPA issues and oversees point-source discharge permitting under Section 402 of the CWA, the U.S. Army Corps of Engineers (USACE) issues "dredge and fill" permits under Section 404 of the CWA. Under CWA Section 404, mining operations may need to obtain a permit from USACE to address the discharge of dredged or fill materials into surface water, including wetlands. In areas with streams, wetlands, or lakes, excavation and construction activities may trigger this requirement. Some regulatory uncertainty exists regarding how mining overburden, slurry and tailings are regulated under the CWA because of different definitions of fill material used by EPA and USACE. Thus, Section 404 permits have been issued for mining operations outside of Section 402 NPDES permitting requirements.[83]

- **Air Emissions:** No federal air regulations specifically oversee fugitive dust concerns in mining operations, although the federal surface management regulations under BLM and USFS described above tend to require dust control practices. While these requirements are not discussed in the context of air toxics management, these measures are frequently incorporated into mining permits.

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[79] Seepage to groundwater is not considered a point source, and is not regulated under the Clean Water Act. The classification of point and nonpoint discharges from mining operations has evolved over time. For more information regarding current definitions of point sources from mining operations, see: *Greater Yellowstone Coalition v. Lewis*, 628 F.3d 1143 (9th Cir. Dec 23, 2010)

[80] U.S. Environmental Protection Agency Region 10, *EPA and Hardrock Mining: A Source Book for Industry in the Northwest and Alaska* (Washington, DC: U.S. Government Publishing Office, 2003). Accessed November 7, 2015, at: http://yosemite.epa.gov/R10/WATER.NSF/Sole+Source+Aquifers/hardrockmining.

[81] Best management practices for stormwater permits are described at 40 CFR 122.2.

[82] The classification of point and nonpoint discharges from mining operations has evolved over time. For more information regarding current definitions of point sources from mining operations, see: *Greater Yellowstone Coalition v. Lewis*, 628 F.3d 1143 (9th Cir. Dec 23, 2010)

[83] C. Copeland, "Controversies over Redefining 'Fill Material' Under the Clean Water Act," *Congressional Research Service*, No. RL31411 (Washington, DC: U.S. Government Printing Office, 2013).

State Regulations

Over time, state mining reclamation laws shifted from focusing on coal mining operations only, to cover metals and ultimately surface and underground mining. The eight states with the most mining activity[84] have enacted surface mining management and reclamation laws, while all but Idaho regulate underground mining. Minnesota was the first to enact a surface mine reclamation requirement for minerals (in 1969), while Arizona was the last (in 1996). Other states with limited or no hardrock mining activity generally have not established regulatory programs for hardrock mining. For example, Texas has promulgated reclamation standards only for uranium operations. In Indiana, local authorities, rather than state agencies, establish requirements for land use and reclamation.

Non-Operating Sites and Currently Operating Facilities

Mine water may pass through open pits or underground adits and enter the local environment through runoff to surface water or seepage to groundwater. AMD is of particular concern because there is often a significant lag time between the start of mine operations and the observation of acidic drainage.[85] It may take at least five years for the oxidization of the acid-generating material and subsequent transportation into the local environment to take place.[86] A review of available documents revealed that releases related to extraction practices occurred at four of 29 non-operating sites and two of 70 currently operating facilities. This review separately considers releases from waste rock piles (an byproduct of surface and underground mining) later in this document, including 18 additional non-operating mines and five additional currently operating mine that experienced releases.[87]

This review of contemporary mines did not capture information characterizing the scope and efficacy of reclamation and closure practices. Improper and failed reclamation have been the basis for past CERCLA actions at hardrock mines, and remains a consideration for the environmental performance of contemporary mines.

Non-Operating Sites

Documents confirmed that 10 of the 29 non-operating mining and processing sites sampled for this review practiced surface and/or underground mining.[88] Two sites conducted exclusively surface mining, three sites conducted exclusively underground mining, and 5 sites conducted

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[84] Those states are Alaska, Arizona, California, Idaho, Minnesota, Montana, Nevada, Utah.

[85] U.S. Environmental Protection Agency, *Technical Report: Acid Mine Drainage Prediction* (Washington, DC: U.S. Government Printing Office, 1994), p. 2.

[86] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 8.3.4.

[87] For more detail, see Sections 2A and 2B on mine-influenced water and waste rock deposition.

[88] Note that it is likely, based on a review of mining and milling practices, that most if not all 29 non-operating sites reviewed practiced surface and/or underground mining. Documentation specifically described those practices at ten sites, however.

both. Activity at many of the sites extended back before the advent of major environmental legislation but continued into the 1980s and 1990s. At all 3 of the sites where surface or underground mining was responsible for the release of contaminant, the releases occurred as the result of acid mine drainage or mine-influenced water. It may take years to observe issues related to those contaminant vectors, so it is impossible to know if they are the result of past or more recent operations.[89]

- The **Captain Jack Mill** (EPA ID COD981551427) is a Superfund site in Ward, Colorado, that includes the workings of the Big Five Mine and White Raven mine, which included both open pits and underground adits, as well as the Captain Jack mill site. Gold and silver mining occurred at the site from 1861 through 1992. The EPA placed the site on the NPL in 2003 following the detection of antimony, arsenic, cadmium, copper, lead, manganese, thallium, and zinc in nearby Left Hand Creek. The primary source of contamination was AMD from the Big Five adit, which was constructed in the 19th century.[90]
- The **Summitville Mine** (EPA ID COD983778432) is a Superfund site in Rio Grande County, Colorado. It was active from 1875 through 1992. The mine had underground adits and open pits, and extracted gold, silver, and copper. The mine released MIW from various adits and pits at the site. This problem was accentuated by snowmelt and drainage that entered the mine's underground workings and flowed out through the adits before the adits were plugged.[91]
- The **Blackbird Mine** (IDD980725832) was a cobalt mine near Salmon, Idaho, that conducted surface and underground mining. It was operated intermittently from 1883 through 1982. AMD, in addition to the direct discharge of tailings into surface water in the mine's early operation, has released arsenic, cobalt, and copper into the local environment. The underground workings have been identified as a source of AMD.[92]

- One CERCLA site not in the sample, **Barite Hill/Nevada Goldfields** (EPA ID SCN000407714) was proposed for the NPL in 2008. The mine operated from 1989 to 1994. The operator, Nevada Goldfields, Inc., filed for bankruptcy in 1999 and abandoned the site.[93] The mining pits and ponds, and waste rock piles released arsenic, cadmium,

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[89] U.S. Environmental Protection Agency, *Technical Report: Acid Mine Drainage Prediction* (Washington, DC: U.S. Government Printing Office, 1994), p. 2.

[90] U.S. EPA Region 8, Captain Jack Superfund Site Record of Decision (Washington, DC: U.S. Government Printing Office, 2008)

[91] U.S. Department of Health and Human Services, U.S. Public Health Service Agency for Toxic Substances and Disease Registry, Division of Health Assessment and Consultation. Public Health Assessment: Summitville Mine, Del Norte, Rio Grande County, Colorado (Washington, DC: U.S. Government Printing Office, 1997)

[92] U.S. Environmental Protection Agency Region 10, Office of Environmental Cleanup, Blackbird Mine Superfund Site Record of Decision (Washington, DC: U.S. Government Printing Office, 2003)

[93] "NPL Site Barite Hill/Nevada Goldfields, McCormick, South Carolina," U.S. Environmental Protection Agency. Accessed October 8, 2015: https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0407714.

chromium, copper, lead, mercury, nickel, selenium, silver, zinc, and cyanide into the surrounding surface water and soil. The site has also experienced AMD.

Currently Operating Facilities

Documents confirmed that at least 51 facilities conducted surface mining, underground mining, or both, out of the sample of 70 currently operating facilities. Twenty-seven of the 51 facilities exclusively practiced surface mining, 20 exclusively practiced underground mining, and 4 practiced both mining methods. Of those 51 facilities, available documents and databases identified surface and underground mining as the source of contamination at three facilities

- **Kinross Crown Resources Buckhorn** (MSHA ID 4503615) is an underground gold mine located in north-central Washington state. The facility has been active since 2008. In 2008 and 2009, the mine committed 46 violations for discharging water containing sulfates and total dissolved solids in excess of permitted concentrations. The mine has discharged the contaminants into the groundwater, surface water, and springs and seeps. Causes of the discharges included the failure of the wastewater treatment system, seepage of mine water from the underground mine, and acid drainage from mine operation areas, including the underground workings. In 2012, the Washington Department of Ecology levied a $395,000 civil penalty against Crown, which was resolved through a 2013 Settlement Agreement. Water quality violations from the mine have continued in 2014 and 2015.[94]
- **Smoky Canyon Don** (MSHA ID 1001590) is an open pit phosphate mine located near Soda Springs, Idaho. Simplot has operated the facility since 1983. Selenium poisoning of local cattle created concern about Smoky Canyon and other nearby phosphate mines in the 1990s. In 2006, the USFS ordered a Non-Time Critical Removal Action to address the release of selenium and other constituent materials from Smoky Canyon Don. The selenium originated in overburden disposal areas, where operators deposit soil and other material that overlays ore deposits. The overburden disposal areas released selenium into both nearby Pole Canyon Creek and groundwater. The USFS and Simplot reached a Settlement Agreement/Consent Order to determine the nature and extent of the contamination, and a 2012 Engineering Evaluation/Cost Analysis to address additional potential pathways of contamination.[95]

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[94] Ann Maest, "Analysis of Water Quality Impacts at the Buckhorn Mountain Mine and Recommendations for Improvement: Final Report," prepared by Stratus Consulting, Inc., for the Okanogan Highlands Alliance (November 4, 2010). Accessed 16 September 2016 at: http://s3.amazonaws.com/zanran_storage/okanoganhighlands.org/ContentPages/2478359423.pdf; and Accountability for Buckhown Water Quality Deterioration: Violations Mount," Okanogan Highlands Alliance. Accessed 16 September 2016 at: http://www.okanoganhighlands.org/mine-monitoring/mine-seepage.

[95] Formation Environmental for J.R. Simplot Company. *Final: Smoky Canyon Mine Remedial Investigation/Feasibility Study – Remedial Investigation Report.* September 2014.

B. Non-Entry (Solution) Mining and Ion Exchange Processing

Introduction

Non-entry (in situ) mining methods recover materials of interest with little to no physical extraction of rock, obtaining elements dissolved in liquid solutions. In the United States, the most common of these methods are ISL, in which aqueous solutions (lixiviants) are injected into wells to help dissolve minerals of interest, and brine extraction, in which underground sources of water with naturally dissolved elements of economic interest (brine) are pumped to and processed at the surface. These methods of extraction and processing, primarily associated with uranium recovery, generate less waste material and cause fewer surface disturbances than surface or underground mining techniques.[96, 97] However, there are still significant environmental risks associated with mining methods such as ISL, particularly to local groundwater.[98]

Non-entry mining can release hazardous contaminants into the environment. The primary threats are releases to adjacent groundwater and to surface soils and water from spills. At the federal level, the Underground Injection Control (UIC) program under the Safe Drinking Water Act (SDWA) manages activities that may pose a risk to groundwater resources. For uranium mining, the EPA and the Nuclear Regulatory Commission (NRC) have also promulgated a variety of technical standards for uranium facilities that address health, safety, and environmental issues under the Atomic Energy Act of 1954 and the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA).

In part because of the relatively recent expansion in use of this extraction method, limited evidence from non-operating Superfund sites was available to illustrate these practices or associated releases. Other publicly available sources, however, have documented releases related to ISL and its attending processing practices at currently operating uranium facilities. This is of significant concern, given the inherent risks associated with underground injection of lixiviants and the severity of potential risks that may stem from uranium recovery practices.

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[96] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[97] B. Dershowitz, "Discrete fracture network modeling in support of in situ leach mining," *Mining Engineer Magazine* (November 2011). Accessed October 2, 2015, at: http://www.golder.com/eu/en/modules.php?name=Publication&sp_id=241&page_id=212&service_id=50.

[98] A recent proposed rulemaking under UMTRCA focused on the potential environmental and health risks posed by ISL uranium mining. See U.S. Environmental Protection Agency, Office of Radiation and Indoor Air, *Draft Report: Economic Analysis: Proposed Revisions to the Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings Rule (0 CFR Part 192)* (November 2014).

Past and Current Use

In the United States, non-entry mining operations recover uranium, copper, potash, magnesium, and lithium.[99] For uranium operations, this technique is also referred to as "in situ recovery." The most common applications are ISL operations to extract uranium in Texas, Wyoming, and Nebraska and copper in Arizona.[100] ISL operations in Texas and Wyoming have extracted water-soluble salts and uranium since the 1960s.[101] In the 1980s, ISL became increasingly prevalent for recovering uranium. Conventional surface and underground uranium mines and the mills that processed the extracted ore were phased out; only one conventional mill processing ore from two mines remains in the United States.[102] Processing practices associated with uranium – such as ion exchange, resin stripping, precipitation, and drying – now take place almost exclusively at or in association with ISL facilities.[103]

Brine extraction has been used to recover lithium in Nevada and zinc in California, while the Frasch process (which uses hot, high-pressure water) recovers sulfur in Texas and Louisiana. Bore-hole mining, which uses water jets to break rocks into slurry that is pumped to the surface, has also recovered phosphate in Florida and uranium in Wyoming.[104]

Non-entry methods for other minerals have been more difficult to implement, as only certain types of deposits are amenable to these methods.[105] ISL requires highly permeable sandstones, such as those containing uranium, while other non-entry methods leverage naturally existing deposits of minerals dissolved in groundwater. Copper ISL operations primarily recover minerals

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[99] J. Kyle, D. Maxwell, and B. Alexander, "Chapter 11.5: In-Situ Techniques of Solution Mining," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[100] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[101] T. Albanese and J. McGagh, "Chapter 1.3: Mining: Future Trends in Mining," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 1.

[102] "Uranium Mining Overview," World Nuclear Association, updated June 2015. Accessed January 21, 2016, at: http://www.world-nuclear.org/info/nuclear-fuel-cycle/mining-of-uranium/uranium-mining-overview/.

[103] "Uranium Mining Overview," World Nuclear Association, updated June 2015. Accessed January 21, 2016, at: http://www.world-nuclear.org/info/nuclear-fuel-cycle/mining-of-uranium/uranium-mining-overview/.

[104] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[105] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

where prior mining has created sufficient permeability for leaching solutions to contact ore minerals, although these operations experience lower recovery rates.[106]

Technical Description

Non-entry (in situ) mining recovers materials of interest with little to no physical extraction of rock, recovering elements dissolved in solutions. Because it eliminates the need to remove and manage extraction wastes, non-entry mining is typically more economical than conventional excavation techniques, and is particularly feasible for low-grade deposits.[107]

ISL dissolves metals and other minerals from rocks by first injecting chemical lixiviants through a drilled well.[108] Minerals of interest react with the solution and are mobilized from the rock into the solution, referred to as a pregnant solution. The pregnant solution is then extracted from a recovery well. After the minerals of interest have been removed from the solution, the lixiviant may be reused. The parent material containing the ore and the geochemical behavior of the commodity itself determine the type of lixiviant used. Alkaline lixiviants (generally sodium carbonate and sodium bicarbonate) are predominant in North America. Compared to acidic lixiviants (such as sulfuric acid) that are more powerful dissolving agents, alkaline lixiviants create less environmental impact.[109]

Brine extraction is a related technique to ISL that injects water only, or pumps to the surface brines containing naturally dissolved materials.[110] For example, heated water is used to recover magnesium.[111] For aqueous deposits containing naturally dissolved materials, the brine solution is pumped to the surface and evaporated. The Frasch process (used to recover native sulfur) and

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[106] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[107] J. Kyle, D. Maxwell, and B. Alexander, "Chapter 11.5: In-Situ Techniques of Solution Mining," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[108] A lixiviant is a liquid medium used in hydrometallurgy to selectively extract the desired metal from the ore or mineral. It assists in rapid and complete leaching. The metal can be recovered from it in a concentrated form after leaching. See American Institute of Mining Engineers, *Transactions of the American Institute of Mining Engineers* 49 (Princeton: Princeton University, 1917), p. 617.

[109] J. Kyle, D. Maxwell, and B. Alexander, "Chapter 11.5: In-Situ Techniques of Solution Mining," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[110] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[111] "In Situ Recovery Facilities," U.S. Nuclear Regulatory Commission, last updated March 31, 2015 .Accessed from: http://www.nrc.gov/materials/uranium-recovery/extraction-methods/isl-recovery-facilities.html.

bore-hole mining also use water to dissolve, melt, or break apart rock, and then pump the solution or mixture to the surface.[112]

ISL extraction is particularly amenable to previously mined ore bodies, which allow for increased contact with rock, although new technologies in non-entry mining also use fracturing or drilling to enhance contact with ore.[113] For example, the most successful practice for copper ISL generally takes place in previously mined ore bodies, which allows lixiviants to contact rubble of lower grade wall rock.[114] Through injection wells, lixiviant solution floods underground mine caverns and extracts ore left in the walls of mining operations. The saturated brine is pumped out through extraction wells. The solution from ISL or brine extraction is pumped aboveground through separate recovery wells and is processed in surface treatment facilities using ion exchange columns, precipitation reactions, or solvent extraction.[115]

In Situ Leaching and Ion Exchange Processing of Uranium

Ion exchange represents the most common method of follow-on processing after recovery of uranium-bearing solution. For uranium, a lixiviant composed of a native groundwater from the host aquifer, a complexing reagent to leach the uranium, and an oxidant is injected into a well. The leach liquor oxidizes and dissolves the uranium, creating a pregnant solution.[116] Extraction wells pump the solution to the treatment plant, where it passes through ion exchange resins, binding the constituent uranium compounds to the resins in the form of a uranyl carbonate.[117] Additional oxidant and reagent are added to the barren leach solution, which is recycled to the

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[112] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[113] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[114] J. Kyle, D. Maxwell, and B. Alexander, "Chapter 11.5: In-Situ Techniques of Solution Mining," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[115] J. Kyle, D. Maxwell, and B. Alexander, "Chapter 11.5: In-Situ Techniques of Solution Mining," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[116] "In Situ Leach (ISL) Mining of Uranium," World Nuclear Association, updated July 2014. Accessed January 21, 2016, at http://www.world-nuclear.org/info/nuclear-fuel-cycle/mining-of-uranium/in-situ-leach-mining-of-uranium/.

[117] It is also possible to capture the uranium compounds through a liquid ion exchange, or solvent extraction system. In the United States, however, "[ion exchange] is used in the vast majority of ISL operations" and "ion exchange operations [are] used by most if not all in situ operations." See "In Situ Leach (ISL) Mining of Uranium," World Nuclear Association, updated July 2014. Accessed January 21, 2016, at http://www.world-nuclear.org/info/nuclear-fuel-cycle/mining-of-uranium/in-situ-leach-mining-of-uranium/; and "Identification and Description of Mineral Processing Sectors and Waste Streams: Uranium," U.S. Environmental Protection Agency, last updated November 15, 2012. Accessed January 11, 2016, at https://archive.epa.gov/epawaste/nonhaz/industrial/special/web/pdf/part1.pdf.

leach circuit.[118] A concentrated chloride salt solution then strips the uranium compound from the resins.[119] Hydrochloric acid is applied to remove the carbonate from the uranium, at which point hydrogen peroxide precipitates the uranium out of the salt solution.[120] The uranium crystals are then filtered, dried, and roasted to create uranium oxide concentrate, or "yellowcake," a product containing about 80-85% uranium by mass.[121] The resultant yellowcake is shipped to a separate facility for conversion to nuclear reactor fuel.[122]

Usually, a uranium ISL facility encompasses the uranium source, injection wells, an ion exchange circuit, the precipitation circuit, and the roasting circuit. It is possible, however, for some processing stages to occur at a remote uranium source. The ISL leach liquor can be pumped to a central processing facility where it undergoes ion exchange, sometimes alongside leach liquor from conventional ore that has undergone heap leaching.[123] Alternatively, a remote facility may include an ion exchange circuit and ship the loaded resins to a central precipitation and roasting facility.[124]

Potential Sources of Hazardous Substances

Because non-entry mining does not physically remove rock, this method of extraction generates less solid waste material and causes fewer surface disturbances than surface or underground mining techniques.[125,126] Non-entry mining therefore presents a lower risk of harms associated

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[118] "In Situ Leach (ISL) Mining of Uranium," World Nuclear Association, updated July 2014. Accessed January 21, 2016, at http://www.world-nuclear.org/info/nuclear-fuel-cycle/mining-of-uranium/in-situ-leach-mining-of-uranium/.

[119] "Identification and Description of Mineral Processing Sectors and Waste Streams: Uranium," U.S. Environmental Protection Agency, last updated November 15, 2012. Accessed January 11, 2016, at https://archive.epa.gov/epawaste/nonhaz/industrial/special/web/pdf/part1.pdf.

[120] "Identification and Description of Mineral Processing Sectors and Waste Streams: Uranium," U.S. Environmental Protection Agency, last updated November 15, 2012. Accessed January 11, 2016, at https://archive.epa.gov/epawaste/nonhaz/industrial/special/web/pdf/part1.pdf.

[121] "Uranium Mining Overview," World Nuclear Association, updated June 2015. Accessed January 21, 2016, at http://www.world-nuclear.org/info/nuclear-fuel-cycle/mining-of-uranium/uranium-mining-overview/.

[122] Note that ion exchange is also used to extract uranium in phosphate processing; uranium and phosphate rock often occur together, and ion exchange can remove radioactive elements from phosphate to be sent for fertilizer processing. See International Atomic Energy Agency, *The Recovery of Uranium from Phosphoric Acid* (Conference Held at Vienna, Austria, March 16-19, 1987).

[123] "Uranium Mining Overview," World Nuclear Association, updated June 2015. Accessed January 21, 2016, at http://www.world-nuclear.org/info/nuclear-fuel-cycle/mining-of-uranium/uranium-mining-overview/.

[124] "In Situ Leach (ISL) Mining of Uranium," World Nuclear Association, updated July 2014. Accessed January 21, 2016, at http://www.world-nuclear.org/info/nuclear-fuel-cycle/mining-of-uranium/in-situ-leach-mining-of-uranium/.

[125] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[126] B. Dershowitz, "Discrete fracture network modeling in support of in situ leach mining," *Mining Engineer Magazine* (November 2011).

with solid waste or surface disturbances. ISL methods, however, may cause groundwater contamination from chemical lixiviants, or from dissolved metals or co-occurring elements such as thorium, radium, radon, arsenic, vanadium, zinc, selenium, and molybdenum.[127] The type of reagent can increase the potential risk of contamination. For example, ISL using acidic reagents changes the pH of groundwater and dissolves other minerals and metals in addition to the target uranium. In contrast, the alkaline bicarbonate reagents used in the United States selectively dissolve uranium, with much lower risk of contamination.[128] As of 2009, no remediation of an ISL operation in the United States for which data are available had successfully returned the aquifer to baseline conditions. More than half of those ISL operations experienced uranium and selenium levels above the baseline even after groundwater restoration efforts.[129]

Some of the impacts associated with non-entry mining can be avoided with proper engineering and management before the commencement of mining activities.[130] Monitoring and maintenance limit the release of lixiviants and mobilized metals from ISL operations. Practices to limit the environmental impact of ISL include baseline environmental data collection, pilot operations with test liquids, and installation of monitoring wells.[131,132] This includes the proper engineering of well and surface infrastructure, analysis of background groundwater chemistry, and analysis and testing of aquifer hydrology and geology using pump tests. In addition, monitoring wells are installed farther down gradient from the well cluster to monitor groundwater and ensure that lixiviant is not escaping the mining area.

Ensuring a net inflow of clean water into the capture zone can also prevent injection solution from escaping due to pressure gradient differences.[133] After ISL and related processing operations, reclamation entails the removal of all radiological hazards (for uranium extraction operations), capping and covering of drill holes, and restoration of groundwater to pre-ISL

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[127] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[128] J. Kyle, D. Maxwell, and B. Alexander, "Chapter 11.5: In-Situ Techniques of Solution Mining," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[129] Susan Hall, "Groundwater Restoration at Uranium In-Situ Recovery Mines, South Texas Coastal Plain," Open-File Report 2009-1143, *U.S. Geological Survey* (Talk presented in Keystone, CO, on 11 May 2009).

[130] Gavin Mudd, *An Environmental Critique of In Situ Leach Mining: The Case Against Uranium Solution Mining* (Melbourne: Australian Conservation Fund, 1998). Accessed October 2, 2015, at: http://www.sea-us.org.au/pdfs/isl/no2isl.pdf.

[131] U.S. Nuclear Regulatory Commission, *Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities* (Washington, DC: U.S. Government Printing Office, 2009). Accessed 2 October 2015 at: http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1910/v1/intro-ch1.pdf.

[132] B. Dershowitz, "Discrete fracture network modeling in support of in situ leach mining," *Mining Engineer Magazine* (November 2011).

[133] B. Dershowitz, "Discrete fracture network modeling in support of in situ leach mining," *Mining Engineer Magazine* (November 2011).

conditions.[134,135] Depending on geologic and hydrologic conditions, however, metals and leach solution may seep into surrounding aquifers post-closure.[136]

Non-entry mining that does not use chemical lixiviants may cause leakage of water, but this can often be safely discharged into nearby surface water. Drilled wells from any of these methods, however, may cause the surface lands to sink or shift (subsidence).[137,138]

Groundwater restoration techniques include direct cleaning or "self-cleaning."[139] Direct cleaning, which is the most common method in the United States, uses reverse osmosis, washing and restoration with natural groundwater, or cleaning by precipitation. Self-cleaning uses natural attenuation, but this process may take place over tens to hundreds of years. It can be accelerated through increasing groundwater flow rates, or by introducing substances to encourage bacterial bio-remediation. Alternatively, a "groundwater sweep" restoration pumps water from the mined aquifer to a deeper aquifer, to surface evaporation ponds, or to the next aquifer subject to ISL.[140]

Even with the application of the above mitigation strategies, the majority of ISL mines experience higher levels of selenium and uranium in the groundwater after restoration than before mining started.[141]

Exhibit 1.B.1. provides more detail about the sources of potential releases from non-entry mining, as well as the management methods that may mitigate these risks.

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[134] B. Dershowitz, "Discrete fracture network modeling in support of in situ leach mining," *Mining Engineer Magazine* (November 2011).

[135] U.S. Nuclear Regulatory Commission, *Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities* (Washington, DC: U.S. Government Printing Office, 2009).

[136] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[137] J.T. Laman, "Chapter 10. Solution Mining and In-Situ Leaching," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997).

[138] Land subsidence is a geological phenomenon that occurs when large amounts of groundwater are withdrawn from rock formations, causing rocks to fall cave or fall in. Source: "Land Subsidence," U.S. Geological Survey, updated August 20, 2015. Accessed October 2, 2015, at: http://water.usgs.gov/ogw/subsidence.html

[139] J. Kyle, D. Maxwell, and B. Alexander, "Chapter 11.5: In-Situ Techniques of Solution Mining," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[140] Susan Hall, "Groundwater Restoration at Uranium In-Situ Recovery Mines, South Texas Coastal Plain," Open-File Report 2009-1143, *U.S. Geological Survey* (Talk presented in Keystone, CO, on 11 May 2009).

[141] Susan Hall, "Groundwater Restoration at Uranium In-Situ Recovery Mines, South Texas Coastal Plain," Open-File Report 2009-1143, *U.S. Geological Survey* (Talk presented in Keystone, CO, on 11 May 2009).

Exhibit 1.B.1. Potential Releases Associated with ISL and Ancillary Processes[142,143,144]

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
Lixiviant contamination of surrounding groundwater(horizontal excursion)	The primary concern associated with ISL is contamination of surrounding groundwater (excursions). Excursions can occur due to poor design of the wellfield (pattern of injection, recovery, and monitoring wells). The wellfield needs to be carefully designed to follow the flow of groundwater. Unpredicted aspects of aquifer geology (e.g., fractures in the parent material) can also lead to poor wellfield design and excursions. Depending on the parent material, gypsum, calcite, or other minerals can form precipitates in the lixiviant eventually plugging the aquifer, wells, or pumps. In addition, some lixiviants can lead to increased microbial growth (by introducing previously limiting elements), which can also clog rock pores and impact pressure. Failure of an injection or recovery well as well as pore clogging can alter the pressure gradient in the underground aquifer being mined, leading to excursions. Leaks caused by the lixiviant are most commonly associated with acidic lixiviants, which can corrode well infrastructure. Mechanical failure can occur if exploratory or other wells not in use in the mining operation are present and not properly plugged or if pipe joints have separated or casings have ruptured. These types of excursions are especially difficult to detect and remedy.	Pump tests are usually conducted before mining commences to ensure proper understanding of the groundwater hydrology and aquifer chemistry and geology. If these tests are conducted with realistic pumping pressures and conditions they can allow for the analysis of potential problems. The use of alkaline lixiviants in the United States also decreases the likelihood of gypsum, calcite and other mineral formations. EPA guidelines for Class III wells mandate that more liquid be removed from the recovery well than was input in injection wells (typically 0.5 percent to 5 percent more) in order to minimize the possibility of excursion. Monitoring wells allow for quick detection of any excursions so that they can be cleaned up. The plugging of wells is essential. Well shafts are typically encased (e.g., Polyvinyl chloride [PVC] pipe) to avoid leakage and vertical flow.
Surface spills of lixiviant	Flash floods can lead to failures during such extreme weather events if surface equipment is not properly engineered. Surface spills can also occur during processing or during "wash downs" of processing plant equipment.	Proper engineering of surface equipment is necessary to account for any potential extreme weather events. In addition, to prevent surface exposure at processing facilities, most are designed with curbed concrete floors and drainage systems. The drainage systems are designed to collect any spilled fluids and transfer them to surface retention ponds.
Leaks from storage/disposal of mining fluids in evaporation ponds	As lixiviant becomes degraded with continued cycling through the mine, fresh lixiviant needs to be introduced. Spent mining solutions are temporarily stored in surface retention ponds before final disposal (e.g., processing and re-injection underground for fluids or disposal at an NRC-licensed site for solids, for uranium recovery). During this time there is a	Alkaline lixiviant is the only type currently used in the US and typically produces lower levels of impurities in mined fluids. This enhances recycling of lixiviant and decreases the amount of wastewater that needs to be stored and managed above ground.

[142] "Environmental Impacts of Different Uranium Mining Processes," Alberta Environment, last updated 2008. Accessed October 2, 2015, at: https://extranet.gov.ab.ca/env/infocentre/info/library/8178.pdf.

[143] Gavin Mudd, *An Environmental Critique of In Situ Leach Mining: The Case Against Uranium Solution Mining* (Melbourne: Australian Conservation Fund, 1998).

[144] U.S. Nuclear Regulatory Commission, *Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities* (Washington, DC: U.S. Government Printing Office, 2009).

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
	risk of leakage at these surface ponds. Surface ponds can also be breached during flash floods or other storm events.	Proper pond lining can limit the chance of leaks. This design could include two separate layers of chemically unreactive plastic (e.g., high density polyethylene) with sand or another porous material between them. Placing a layer of clay underneath that liner would further protect against leaching should a leak occur. Retention ponds must also have leak detection systems.
Release of radon and other radioactive elements from leaching fluids	Radon is a known carcinogen and can be released during both the construction of ISL wellfields as well as during ion exchange and related processing. In addition, substantial quantities of radon can be released from spent mining fluids being temporarily stored in surface retention ponds.	Because of the short half-life of radon (3.8 days) in the environment no active management typically occurs for this type of pollution. Rather, dilution and degradation in the atmosphere is typically sufficient. Limited air monitoring is normally conducted.
Release of radioactive materials in dust	Particulates can accumulate around ion exchange facilities. These can include uranium dust or salts that can precipitate out of the lixiviant. These are then introduced into the environment through ventilation of the processing facility.	Processing typically contains dust collection systems that capture these particulates and in most cases collects 99% of contaminants.
Reclamation of mining fluids	After an ore body has been fully mined groundwater must be restored to pre-mining quality. As such, groundwater in the mined area is chemically treated to remove excess contaminants above background levels. This is done in a four step process: removal of contaminated water by ceasing injection and continuing removal, pre-treatment via reverse osmosis, chemical treatment to precipitate and immobilize contaminants, and re-introduction of the treated water. Undocumented background levels and insufficient treatment can lead to groundwater contamination. Most ISL mining zones are situated between two low permeability clay deposits. Clay has a high surface area and the unique ability to store large amounts of cations. As such, potentially harmful chemicals from the lixiviant can attach to clay particles and persist there (potentially beyond remediation activities) until the groundwater chemistry favors their eventual release.	A substantial suite of background data should be collected before the commencement of mining activities. These data should include measurements of sulfates, pH, total salinity, uranium, radium, arsenic, molybdenum, and selenium. Proper chemical treatment of mining fluids requires a strong understanding of the unique chemistry and geology of each ISL site.
Transport and disposal of solid radioactive wastes	The processing of lixiviant from ion exchange and subsequent circuits produces solid radioactive wastes, such as spent resin and tank sediments. These wastes are typically stored in surface retention ponds until they, along with residual pond sludge, need to be transferred to NRC-licensed disposal facilities once the mine is decommissioned.	Proper transport and disposal of solid waste according to existing regulations should avoid these impacts.

State and Federal Regulations

Both federal and state regulatory programs manage non-entry mining.

The UIC program under the federal SDWA and delegated state programs regulate the construction, operation, permitting, and closure of injection and extraction wells in order to protect underground sources of drinking water.[145] Additionally, EPA's New Source Performance Standards (NSPS) prohibit mines and mills using ISL methods from discharging process wastewater, unless annual precipitation exceeds annual evaporation.[146] ELGs under the CWA also specify requirements for pH, total suspended solids, chemical oxygen demand, and specific contaminants.[147] For non-entry mining facilities that discharge to surface waters, these requirements are incorporated into permits.

For uranium ISL facilities, the predominant commodity extracted using non-entry mining, the EPA and the U.S. Department of Energy (DOE) have also promulgated a variety of technical standards for uranium facilities that address health, safety, and environmental issues under the Atomic Energy Act of 1954 and UMTRCA of 1978. The standards include the removal of contaminated equipment and material, cleaning up evaporation ponds, plugging wells, backfilling and recontouring disturbed areas, revegetation, and site radiation surveys. Waste products from processing are regulated by the NRC and must be disposed of in a licensed disposal facility.[148]

While UMTRCA has historically regulated only traditional uranium mill processes, EPA promulgated a proposed rule establishing ground water restoration and monitoring requirements at ISL facilities under UMCTRA. These requirements, which would be implemented by the NRC, include preliminary characterization of aquifer geochemistry and groundwater conditions, corrective action in the case of contamination, wellfield restoration, and post-operational monitoring for groundwater quality. These baseline and restoration tests would address 13 of the most important chemicals affecting groundwater pollution: arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, nitrate (as nitrogen), molybdenum, radium, total uranium and gross alpha particle activity.[149]

The Office of Surface Mining, the U.S. Department of the Interior, and individual states regulate conventional surface or underground uranium ore extraction. On the other hand, the NRC regulates

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[145] "Underground Injection Control," U.S. Environmental Protection Agency, Under Ground Injection Control Program, last Updated November 2013. Accessed October 2, 2015, at: http://water.epa.gov/type/groundwater/uic/index.cfm.

[146] U.S. Environmental Protection Agency, Office of Solid Waste, Special Waste Branch, *Technical Resource Document: Extraction and Beneficiation of Ores and Minerals* EPA 530-r-94-013, Volume 5: Uranium (Washington, DC: U.S. Government Printing Office, 1994).

[147] 40 CFR 440 (CWA effluent limitation guidelines: ore mining and dressing point source category).

[148] J. Kyle, D. Maxwell, and B. Alexander, "Chapter 11.5: In-Situ Techniques of Solution Mining," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[149] 80 FR 4156. Vol. 80, No. 16, 4156. January 26, 2015. *Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings; Proposed rule.* Accessed 28 June 2016 at: https://www.regulations.gov/document?D=EPA-HQ-OAR-2012-0788-0001

uranium processing and concentration. ISL uranium facilities, even standalone ISL facilities that transport recovery fluid to a separate plant for further processing, fall under the purview of the NRC.[150] The NRC requires the restoration of aquifer quality to the use class prior to mining operations. NRC and delegated "agreement states" issue licenses for uranium in situ solution mining and conduct environmental reviews of the construction, operation, and decommissioning of uranium ISL facilities.[151]

State Regulations

In Texas, after ISL operations are completed, all radiological hazards must be removed and groundwater must be restored to pre-operational conditions under Title 30 Section 331.107(b). The Texas Commission for Environmental Quality (TCEQ) regulates underground injection wells through the Underground Injection Well Permit Program, under Chapter 27 of the Texas Water Code. 30 TAC 331.104 requires that a restoration table in the UIC permit that establishes levels for key constituents, meeting the pre-existing conditions for groundwater of the mining zone.

In situ uranium operations in Texas are required to obtain a radioactive material license, which TCEQ issues. The Texas Railroad Commission regulates the exploration phase of ISL uranium mining through a permit program. Wyoming, South Dakota, and New Mexico also regulate uranium ISL operations under state-specific mining programs, which require reclamation and bonding.[152] In Arizona, copper ISL facilities must also obtain an Aquifer Protection Permit (APP), use best demonstrated control technology, and maintain state aquifer water quality standards.

Non-Operating Sites and Currently Operating Facilities

Most non-entry mining sites in the United States are uranium production and processing facilities, and ISL for uranium is a relatively new extraction method. Thus, scant documentation about non-operating ISL sites exists. In more recent years, the use of ISL and related processing methods has expanded such that only one conventional uranium mine and associated mill operation remains in the United States. Releases related to ISL have increased concomitant to that expansion, as reflected in the sample.

Non-Operating Sites

ISL is a relatively new mining method. As such, none of the reviewed documents recorded any releases associated directly with ISL or non-entry mining. However, alkaline leach and ion exchange,

[150] "Uranium Recovery: What We Regulate," U.S. Nuclear Regulatory Commission, updated February 10, 2015. Accessed January 21, 2016, at http://www.nrc.gov/materials/uranium-recovery.html.

[151] U.S. Nuclear Regulatory Commission, *Generic Environmental Impact Statement for In Situ Leach Uranium Milling Facilities* (Washington, DC: U.S. Government Printing Office, 2013). Accessed October 2, 2015, at: http://www.nrc.gov/materials/uranium-recovery/geis.html.

[152] U.S. Nuclear Regulatory Commission, *Generic Environmental Impact Statement for In Situ Leach Uranium Milling Facilities* (Washington, DC: U.S. Government Printing Office, 2013).

the processing method for ISL solution, have been used to process uranium for much longer. Documents confirmed that three of the 29 non-operating mining and processing CERCLA sites sampled for this review extracted metals or minerals through alkaline leach and ion exchange.[153] Tailings ponds failure and the attendant discharge of tailings liquid and other process wastewaters contributed to releases at two of the sites.

- The **Homestake Mining Co.** site (EPA ID NMD007860935) was a uranium mill near Milan, New Mexico, from 1958 to 1990. From the start of activity, the mill operated an alkaline leach-caustic precipitation process to produce yellowcake. Material for the mill originated at five underground uranium mines and a satellite ion exchange facility in Ambrosia Lake, New Mexico. Operators disposed of waste from milling in two on-site tailings ponds. In 1983, EPA placed the site on the National Priorities List due to elevated selenium and uranium concentrations in the local aquifer and nearby groundwater wells. Homestake, the operator of the mill, installed a groundwater injection system to clean the aquifer, but the contamination plume ultimately traveled off-site. Remediation, monitoring, and maintenance continued for at least twenty years after mill closure.[154]
- The **United Nuclear Corporation** (EPA ID NMD30443303) operated a uranium mine mill near Church Rock, New Mexico. The underground mine was active from 1967 to 1982, the mill was active from 1977 to 1982. The site included a leaching circuit and an ion exchange plant. United Nuclear disposed of processing waste in tailings disposal cells. In 1979, the dam for the South tailings disposal cell breached and released 93 million gallons of liquid into the Rio Puerco, contaminating the local aquifer and releasing uranium and radium into local surface water and soils.[155]

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[153] Cyprus Tohono Mine (EPA ID AZD094524097), Homestake Mining Co. (NMD007860935), and United Nuclear Corp. (NMD030443303).

[154] U.S. Environmental Protection Agency, Region 6, *Record of Decision: Homestake Mining Company Radon Operable Unit, Cibola County, New Mexico* (Washington, DC: U.S. Government Printing Office, 1989); "Homestake Mining Co. Superfund Site Description," U.S. Environmental Protection Agency, from September 8, 1993, Federal Register Notice. Accessed January 13, 2012, https://nepis.epa.gov/Exe/ZyNET.exe/20013X6J.TXT?ZyActionD=ZyDocument&Client=EPA&Index=1986+Thru+1990&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C86thru90%5CTxt%5C00000015%5C20013X6J.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=hpfr&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL. and Center For Disease Control, Agency for Toxic Substances and Disease Registry, Health Consultation: Homestake Mining Company Mill Site, Milan, Cibola County, New Mexico (Washington, DC: U.S. Government Printing Office, 2009).

[155] U.S. Environmental Protection Agency, "Action Memorandum: Request for a Non-Time-Critical Removal Action at the Northeast Church Rock Mine Site, McKinley County, New Mexico, Pinedale Chapter of the Navajo Nation," sent September 29, 2011; and U.S. Environmental Protection Agency, Region 6, *Five-Year Review Report: Second Five-Year Review Report for the United Nuclear Corporation Ground Water Operable Unit* (Washington, DC: U.S. Government Printing Office, 2003).

Currently Operating Facilities

Documents confirmed that three of the 70 currently operating facilities reviewed use ISL extraction and/or related processing practices,[156] and three facilities use brine extraction.[157] Of those six, two uranium ISL facilities experienced releases due to ISL practices and related operations.[158]

- **Uranium One Willow Creek** (no MSHA ID) encompasses two distinct sites: the Irigaray processing plant located in Johnson County, Wyoming, and the Christensen Ranch satellite operation, located in Campbell County, Wyoming. Uranium One is the site's owner and operator. Initial activity at the site began at the Irigaray site in 1978; operations from the currently active wells and processing facilities began in 2010. Both sites are in situ uranium recovery mines with ion exchange plants and precipitation circuit. The yellowcake drying/packing circuit is located at Irigaray.

  Since the start of the most recent round of production and processing, the Nuclear Regulatory Commission has filed event reports on at least 34 spills, leaks, or other releases, originating from injection fluid, recovery fluid, production fluid, evaporation ponds, and disposal wells. For example, on August 19, 2011, 7,000 to 10,000 gallons of sodium chloride brine overflowed a tank and spilled. On January 2, 2014, 77,000 gallons of production fluid containing from 11.9 ppm uranium to 13.6 ppm uranium spilled due to a frozen, burst pipe. On August 14, 2015, 492 gallons of in situ recovery fluid containing 11.2 ppm uranium spilled. In addition to those liquid releases, on September 9, 2014, two sampling operators at the Honeywell Uranium Refinery in Illinois opened a barrel of yellow cake shipped from the Willow Creek facility. Willow Creek had not allowed the yellowcake sufficient time to dry, leaving decomposing uranyl peroxide hydrates that pressurized the barrel. Upon opening, the barrel ejected yellowcake in a three foot radius.[159]

- Production at the **Lost Creek** ISL mine (no MSHA ID) in Sweetwater County, Wyoming, operated by Ur-Energy, began in 2013, although limited mineral exploration and activity had taken place at the site dating back to the 1960s. Currently, the facility extracts uranium through six contiguous in situ recovery projects. The recovery fluid is then piped to a processing plant,

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[156] Energy Fuels White Mesa (4201429), Uranium One Willow Creek (no MSHA ID), and Lost Creek (no MSHA ID).

[157] Rockwood Lithium (No MSHA ID), Florida Canyon Mine (MSHA ID 2601947), and Intrepid Potash East/West (No MSHA ID).

[158] A third facility outside of the currently operating sample, the Cogema Mining ISL facility in Bruni, Texas, may have experienced releases during decommissioning activities in 1997-1998, but publicly available documentation is limited regarding these incidents. See, for example, Texas Department of Health. Bureau of Radiation Control, "Radioactive Material Spill – Cogema Mining, Inc. – Bruni, Texas," *Summary of Incidents for Second Quarter 1999* (Dallas: U.S. Government Printing Office, 1999).

[159] "Site Summary: Willow Creek Uranium Recovery Project," Nuclear Regulatory Commission, updated July 15, 2015. Accessed January 21, 2016, at http://www.nrc.gov/info-finder/materials/uranium/licensed-facilities/christensen-ranch.html; and "Issues at Operating Uranium Mines and Milles – Wyoming, USA," World Information Service on Energy, updated September 2, 2015. Accessed September 11, 2015, at http://www.wise-uranium.org/umopuswy.html.

where it undergoes ion exchange, resin stripping, precipitation, and filtering/drying/packaging. Since the resumption of operations in 2013, the Nuclear Regulatory Commission has filed event reports on at least 22 spills, leaks, or other releases of waste water, injection fluid, and production fluid. Further, in December 2013, the state of Wyoming ordered a halt of operation at Lost Creek because the facility failed to maintain the bleed in its injection/recovery ratios, making it possible for contaminated groundwater to escape the mine site.[160] The Nuclear Regulatory Commission issued three additional violations for exposing workers to yellow cake dust in November 2014.[161]

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[160] A "bleed" refers to the need to extract more water than is injected into the aquifer, thus ensuring an inflow of groundwater to the mine site instead of an outflow from the mine site. See "In Situ Leach (ISL) Mining of Uranium," World Nuclear Association, updated July 2014. Accessed January 21, 2016, at http://www.world-nuclear.org/info/nuclear-fuel-cycle/mining-of-uranium/in-situ-leach-mining-of-uranium/.

[161] Douglass H. Graves and Steve E. Cutler, *Preliminary Economic Assessment of the Lost Creek Property, Sweetwater County, Wyoming* (Bozeman, MT: Prepared by TREC, Inc., for Ur-Energy, Inc., 2015); and "Issues at Operating Uranium Mines and Milles – Wyoming, USA," World Information Service on Energy, updated September 2, 2015. Accessed September 11, 2015, at http://www.wise-uranium.org/umopuswy.html.

C. Physical Processing and Gravity and Magnetic Separation

Introduction

Physical processing and gravity and magnetic separation techniques are used widely across the mining industry. Physical processing (or comminution) is a standard first step in many other mineral processing activities. It includes crushing and grinding procedures that reduce the size of ore fragments, either in preparation for market specifications about particle size (such as in the case of iron ore), or to allow further processing (as is the case for base and precious metals).[162] The primary environmental concerns associated with physical processing are the creation of fugitive dust and tailings, which can result in discharges to the environment. Subsequent processing, such as cyanidation, may be associated with process chemicals that can pose additional environmental concerns. Standard industry practice to control dust involves a combination of wetting agents, dust collection and filtration. Containment (typically within a concrete area) is required if process chemicals are employed. After physical processing, magnetic and gravity separation methods exploit differences in the physical properties of crushed particles to isolate minerals of interest. While few regulations specifically regulate physical processing or gravity and magnetic separation, potential environmental discharges from these processes are addressed by many larger regulatory frameworks across federal and state programs.

A review of a sample of non-operating sites and currently operating mining facilities did not indicate evidence of releases specifically related to gravity and magnetic separation. Rather, past waste management practices (e.g., open dumping) and streambed excavation methods contributed to releases. The physical process of grinding and crushing liberates substances previously bound in rock, however, which may be released to the environment in the air and in MIW.

Past and Current Use

Separation and liberation of ore from waste material have been a part of mining operations since the very beginning of the industry. Comminution (encompassing all crushing, milling, and grinding procedures) is used widely across hardrock commodity sectors in the United States, as most ore requires some level of physical processing, either in preparation for further processing or to meet product requirements. Physical processing techniques have experienced few fundamental changes in recent years. Significant improvements in throughput and efficiency have taken place, however. For example, computer models of grinding circuits have reduced waste and use of chemicals by tailoring grinding operations to specific ore characteristics.[163] In addition, currently used equipment has the

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[162] J. Mosher, "Chapter 14.2: Crushing, Milling, and Grinding," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[163] Earle A. Ripley, Robert E. Redmann, and Adèle A. Crowder, *Environmental Effects of Mining* (Delray Beach, Fla: St. Lucie Press, 1996).

ability to mill a broader range of material, while historic grinding mills processed fairly specific particle size ranges.

Gravity separation has historically played a role in recovering gold from placer deposits; currently operating gold operations still use it to recover gold that is not bound to other minerals. The heavy minerals industry (e.g., titanium, zirconium, and hafnium commodities) also uses it extensively for recovery of minerals such as ilmenite, rutile, leucoxene and zircon, as well as to separate coarse-grained metal sulfides.[164,165] Dense medium separation, in which particles sink or float in a liquid medium, also finds applications in iron-ore processing.[166]

Recent improvements in technology have increased the applications of magnetic separation, as the availability of much stronger magnetic fields allows use of this process on additional commodities. For years, magnetic separation was used mainly in the dry separation of minerals from beach sand deposits and to remove tramp iron that can damage equipment, but more recently it has also been used to treat fines at iron-ore operations and remove paramagnetic wolframite and hematite from tin ores.[167,168]

Technical Description

Physical processing prepares ore for further processing and is commonly the first step in beneficiation. Gravity and magnetic separation isolate valuable material from waste either for further processing, or more rarely, as a final product. Unlike many other types of processing that require intensive use of chemicals, gravity and magnetic processing usually involve minimal use of additives. However, process chemicals may be added during physical processing in preparation for other steps (e.g., leaching or flotation).

Physical Processing

Physical processing is the first step in the beneficiation process for most commodities, including those that require further magnetic or gravity separation. It usually involves a multi-step reduction process that entails multiple procedures, from the initial crushing of rock to the ultra-fine grinding required by certain industrial mineral processing applications. The initial steps are generally carried out by crushers, which reduce ore from the originally mined size to the point where grinding can be

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[164] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[165] N. Subasinghe, "Chapter 14.4: Gravity Concentration and Heavy Medium Separation," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[166] Barry A. Wills and Tim Napier-Munn, *Wills' Mineral Processing Technology, Seventh Edition: An Introduction to the Practical Aspects of Ore Treatment and Mineral Recovery*, Seventh Edition (Oxford: Butterworth-Heineman, 2006).

[167] P. Iyer, "Chapter 14.6: Magnetic and Electrostatic Separation," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[168] Barry A. Wills and Tim Napier-Munn, *Wills' Mineral Processing Technology, Seventh Edition: An Introduction to the Practical Aspects of Ore Treatment and Mineral Recovery*, Seventh Edition (Oxford: Butterworth-Heineman, 2006).

undertaken, and screens or other sizing equipment. The crushing process is usually dry, and involves multiple iterations to get the particles to the desired size.[169]

Grinding is the next step, undertaken once the particles are small enough. It is usually carried out as a wet process, with the addition of water (and other process chemicals, such as those for subsequent flotation and leaching processing) to create a slurry.

Gravity Processing

After physical processing, gravity separation uses differences in density to separate heavy minerals and metals from lighter waste material (gangue). Gravity concentrators such as pulsating screens, shaking devices, or flowing film separators create particle movement, causing heavier particles to sink and lighter particles to rise closer to the surface. Gravity separation devices generally use water to create a slurry, and require feed material that is of uniform size. Other fluid media of varying densities, such as solution containing suspended metal particles, can be used to adjust the process to various ore types. These processes tend to be inexpensive to operate and rarely use harmful chemicals in slurry feeds, resulting in relatively less environmental damage than many other processing techniques.[170]

Magnetic Processing

Magnetic processing (either wet or dry) uses differences in magnetic strength to separate out particles. Magnetic pulleys, typically installed in the conveyor head, are commonly used devices.[171] High-intensity magnetic separators, like induced-roll magnetic separators and lift-type magnetic separators, separate materials of varying magnetism by deflecting them with high-intensity magnets. Some magnetic separators, such as the Jones separator, also work on wet feed streams.[172] While magnetic processing primarily separates iron ores, it can also be used for heavy mineral sands (e.g., zircon, ilmenite and rutile).

The electrostatic separation process relies on differences in electrical conductivity rather than magnetic strength. In this dry process, medium-sized particles fall through a high-voltage static field and are diverted by the natural conductivity of the material. This method has generally been used to recover valuable heavy minerals from beach-sand deposits.[173, 174]

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[169] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[170] N. Subasinghe, "Chapter 14.4: Gravity Concentration and Heavy Medium Separation," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[171] P. Venkatraman, F. Knoll, and J. Lawver, "Chapter 7: Magnetic and Electrostatic Separation," in *Principles of Mineral Processing*, eds. Maurice C. Furstenau and Kenneth N. Han (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2014).

[172] P. Iyer, "Chapter 14.6: Magnetic and Electrostatic Separation," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[173] P. Venkatraman, F. Knoll, and J. Lawver, "Chapter 7: Magnetic and Electrostatic Separation," in *Principles of Mineral Processing*, eds. Maurice C. Furstenau and Kenneth N. Han (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2014).

Potential Sources of Hazardous Substances

Physical processing and gravity and magnetic separation generally require few chemical additives and thus have a relatively small potential for adverse environmental impacts from process chemicals.[175] Dust from crushed and ground rock is a primary source of adverse effects during physical processing, posing concerns for human health as well as air and water quality.[176] Water application and enclosure minimize risks from dust created during physical processing, often in conjunction with exhaust ventilation systems that help capture and remove dust before it is expelled from exhaust fans.[177]

Additionally, tailings produced from physical processing and magnetic and gravity separation can contain trace elements and may present health and environmental concerns. Most stand-alone operations (e.g., those where no additional processing is performed) that use only physical processing and gravity and magnetic separation produce tailings that have few hazardous substances, and thus have a lessened potential for environmental harm.[178]Facilities may dispose of wastes from various processes in the same waste management units, however, with the resulting mixture containing more hazardous constituents than tailings from gravity or magnetic separation alone.[179]

The primary method of managing environmental discharges from tailings is to pump the mineral slurries to tailings ponds, where the solids settle to the bottom and consolidate, allowing the cleaned liquid above to be recycled to the plant or discharged. In cases where chemicals are added to the slurry to facilitate additional processing, or where wastes from other processes are co-mingled, tailings ponds may have to be lined with plastic liners or covered to prevent leaks or overflow.[180] Section 2.C. discusses tailings management in more detail.

Exhibit 1.C.1. describes these potential releases in more detail.

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[174] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[175] D. Van Zyl and J. Johnson, ed., "Chapter 8: Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997).

[176] This is particularly important during the grinding process, since the size range of particles undergoing grinding is often in the respirable category. Any particles smaller than 60 micrometers can be suspended in the air and subsequently be inhaled or deposited in nearby ecosystems.

[177] Department of Health and Human Services, Center for Disease Control and Prevention, *Dust Control Handbook for Industrial Minerals Mining and Processing* (Washington, DC: U.S. Government Printing Office, 2012).

[178] D. Van Zyl and J. Johnson, ed., "Chapter 8: Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997).

[179] U.S. Environmental Protection Agency, *Mineral Processing Facilities Placing Mixtures of Exempt and Non-Exempt Wastes in On-site Waste Management Units: Technical Background Document Supporting the Supplemental Proposed Rule Applying Phase IV Land Disposal Restrictions to Newly Identified Mineral Processing Wastes* (Washington, DC: U.S. Government Printing Office, 1995). Accessed October 30, 2015, at: https://archive.epa.gov/epawaste/nonhaz/industrial/special/web/pdf/mixtures.pdf.

[180] D. Dahlstrom, "Chapter 14.7: Dewatering Methods," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

Exhibit 1.C.1. Potential Releases Associated with Physical, Gravity, and Magnetic Processing

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
Fugitive dust	Comminution can release large quantities of dust and fine particles. Dust may also escape from uncovered tailings facilities. Coarse dust usually settles within a few hundred meters of the source. Smaller particle size fractions (PM10), however, can be carried by wind in dust clouds for great distances and may be deposited on or near populated areas. Because the dust may contain trace elements or other harmful substances (e.g. asbestos or silica), human health and environmental problems may arise through direct inhalation, soil and plant deposition, or accumulation within a water body.	The following practices help to manage fugitive dust from physical, gravity, and magnetic processing activities[181]: • Application of water through wet spray systems • Enclosure of the dust source • Exhaust ventilation • Maintenance of a slight negative pressure for enclosed grinding equipment, which ensures that any air leakage will flow into and not out of the equipment.
Tailings	During gravity separation and magnetic separation, the valuable product is separated from the waste material and the waste material is eliminated as tailings. In most cases, the tailings do not use chemical additives, but problems such as MIW with acidic properties or trace elements may arise. If these tailings are not disposed of correctly, runoff and seepage can contaminate groundwater and surface water. If facilities dispose of tailings in impoundments alongside wastes from other processes, the resulting mixtures may also contain higher concentrations of potentially harmful substances.	Proper construction of tailings ponds allows potential contaminants to settle out of water before it discharges. When chemicals are added to the slurry, leak detectors and linings must be employed to ensure that no harmful substances are discharged to the environment.[182, 183] As part of mine design targeted extraction techniques such as selective mining and avoidance could be used to minimize mining of ore resulting in tailings that could result in MIW.[184] As part of the tailings disposal facility design engineered barriers such as a liner can be utilized to collect seepage from tailings resulting in reduced seepage management requirements.[185]

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[181] Department of Health and Human Services, Center for Disease Control and Prevention, *Dust Control Handbook for Industrial Minerals Mining and Processing* (Washington, DC: U.S. Government Printing Office, 2012).

[182] D. Dahlstrom, "Chapter 14.7: Dewatering Methods," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 2.

[183] For more details on the construction of tailings ponds in regards to specific site and tailings characteristics, see D. Van Zyl, J. Johnson, "Chapter 8.5: Tailings Disposal Design," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997).

[184] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.1.

[185] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.6.1.

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
		Another technique is production of paste or dry dewatered tailings to reduce potential for MIW.[186] During operations special handling techniques such the addition of alkaline materials or amendments can be used to reduce potential for AMD from tailings.[187] At closure tailings areas can be reclaimed using dry and wet covers to lessen or minimize discharges of MIW. [188] In the event the mine drainage requires treatment before discharge, either during operations or post-closure, a variety of active, passive and in situ mine drainage treatment techniques are potentially applicable.[189]

[186] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.8.

[187] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.4.2.

[188] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.3.2.

[189] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 7.5.

State and Federal Regulations

While few regulations pertain specifically to physical, gravity and magnetic processing, many broader regulatory frameworks across the industry address these practices at the state and federal level. Section 2.C.4. discusses regulations applicable to tailings management in more detail.

Federal Regulations

Potential releases from physical processing and gravity and magnetic separation for certain ores is regulated under the ELGs outlined by the CWA. For example, the CWA does not allow concentrations of pollutants over a certain level for tungsten mills processing by physical methods, or titanium mills beneficiating by electrostatic, magnetic or physical methods. In addition, it sets limitations on sediment in wastewater discharge and guidelines for treatment for certain types of mining such as placer mining, which often uses gravity separation.[190] As a result, most direct-discharging ore mining and dressing facilities use settling or precipitation treatment.[191] Where ELGs may not apply, technology-based limits are developed during the facility-specific permitting process. The NPDES program applies to both active and inactive mines, as well as abandoned mines where legally responsible owners or operators of point sources can be identified.

While the Clean Air Act (CAA) and RCRA do not directly address fugitive dust or tailings from physical processing and gravity and magnetic separation, state and local governments implement State Implementation Plans (which manage particulate matter emissions) under CAA as well as solid waste management guidelines under RCRA Subtitle D. Under RCRA Subtitle D, the federal government provides information and policy guidance to support state and local governments, such as criteria for the safe re-use of tailings in other industrial applications.[192] In situations where facilities combine tailings with mineral processing wastes that exhibit hazardous characteristics, the waste mixtures may also fall under RCRA Subtitle C regulations. The MSHA also specifies inspections and safety standards for impoundments, retention dams, and tailings ponds, and the Federal Emergency Management Agency (FEMA) is charged with administering a national dam safety program that includes tailings structures.[193]

Mining operations on federal land are subject to additional regulation. According to BLM Section 3809 rules, mining operations must prevent unnecessary or undue degradation, which

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[190] 40 CFR 424 (ferro-alloy manufacturing); 40 CFR 436 (mineral mining and processing); 40 CFR 440 (ore mining and dressing).

[191] U.S. Environmental Protection Agency, *Technical Support Document for the 2004 Effluent Guidelines Program Plan* EPA-821-R-04-014 (Washington, DC: U.S. Government Printing Office, 2004).

[192] U.S. Environmental Protection Agency, *Final Rule: Criteria for the Safe and Environmentally Protective Use of Granular Mine Tailings Known as "Chat"* Docket EPA-HQ-RCRA-2006-0097 (Washington, DC: U.S. Government Printing Office, 2007). Accessed October 30, 2015, at: https://archive.epa.gov/epawaste/nonhaz/industrial/special/web/html/index-4.html

[193] 30 CFR Part 57, Subpart S. For more information, see: "Dam Safety Standards and Technical Guidance," MSHA. U.S. Department of Labor. Accessed October 30, 2015, at: http://www.msha.gov/DamSafety/DamSafetyTechGuidance.asp.

includes managing all tailings, rock dumps, deleterious material or substances and any other waste produced from mining operations.[194] Tailings from physical processing and gravity and magnetic separation fall under this general regulation as waste produced by mining operations and are thus subject to the permitting and approval requirements for operations on BLM lands. Dust suppression measures are usually employed as standard operating procedures under BLM-approved Plans of Operations.

In some cases, specific types of ores are subject to additional regulations. For example, UMTRCA mandates special closure designs for uranium mill tailings ponds to prevent radon gas releases.[195] While gravity and magnetic separation are not typically used for uranium ore, physical processing is generally a first step in beneficiation for uranium.

State Regulations

As with federal BLM surface management guidance, state mining regulatory programs may incorporate practices such as dust control, backfilling, erosion control and revegetation into state mining permits. Some states specifically regulate dust created by mining. For example:

- **Alaska** has a prohibition on fugitive dust, requiring anyone engaging in an industrial activity or construction project to take reasonable precautions to prevent particulate matter from being emitted into the ambient air, and prohibiting emissions harmful to human health or welfare and to animal or plant life. [196]
- **Rhode Island**'s Air Pollution Control Regulation No. 5 on fugitive dust prohibits any person to use matter capable of releasing dust in any way that could cause airborne particulate matter to travel beyond the property line of the emission source without taking adequate precautions to prevent particulate matter from becoming airborne.[197]
- **Michigan**'s Natural Resources and Environmental Protection Act requires crushers, grinding mills and screening operations to be sprayed with water or a surfactant solution, utilize choke-feeding, or be treated by an equivalent method in accordance with an operating program designed to significantly reduce the fugitive dust emissions to the lowest level that a particular source is capable of achieving.[198]
- **Utah**'s Environmental Quality and Air Quality regulations require any person owning or operating a mine to minimize fugitive dust.[199]
- **California's** Asbestos Airborne Toxics Control Measure (ATCM) requires all

[194] 43 CFR Part 3809

[195] UMTRCA, PL 95-604

[196] 18 AAC 50.045(d), 18 AAC 50.110

[197] R.I. Air Pollution Control Regulation No. 5, authorized pursuant to R.I. Gen. Laws § 42- 17.1-2(s) and 23-23

[198] Natural Resources and Environmental Protection Act 451 of 1994. 324.5524 Fugitive dust sources or emissions.

[199] R307-205-7, R307-205-8

construction, grading, quarrying, and surface mining operations in areas known to naturally contain asbestos to take specified control measures during road construction and maintenance operations.[200]

- **Idaho's** Permit by Rule for Non-Metallic Mineral Processing Plants requires that facilities that crush or grind any nonmetallic mineral or rock register with the Idaho Department of Environmental Quality (IDEQ). The rule sets electrical generator rules, fugitive dust control standards, monitoring, and record keeping.[201]

Several state regulations manage tailings, although in some cases tailings from gravity and magnetic separation that have no chemical additives are excluded from regulation. In addition, some regulations only address tailings from specific types of ore. For example:

- **Alaska**'s Department of Environmental Conservation Solid Waste Disposal Permit makes tailings from hardrock mines and tailings from placer mines that have been amalgamated or chemically treated subject to the State solid waste management general standards and requirements, which usually necessitate pre-operational, operation, and post-closure monitoring.[202]Tailings that have not been chemically treated (which is often the case with gravity and magnetic separation), however, are not subject to regulation.
- **Montana**'s Hard Rock Mining Reclamation Act specifies that milling operations are subject to permitting, requiring a detailed description of the design, construction, and operation of the mill, tailings, and waste rock disposal facilities, and best management practices are expected in the disposal of tailings and other waste.[203]
- **Nevada**'s regulations on hazardous materials require that tailings from active and inactive uranium and thorium mills are disposed of in a safe and environmentally sound manner.[204]

Non-Operating Sites and Currently Operating Facilities

The available documents indicate that four out of 29 non-operating sites used gravity separation and 18 out of 29 used physical processing. It is likely, however, that most of these sites used physical processing in conjunction with or in preparation for other types of beneficiation, even though the available documents do not specify this. Out of 57 current sites, available documents indicate that four use gravity separation and 30 use physical processing. Again, though, it is likely that most of these sites employ some physical processing methods.

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[200] 17 CCR 93105

[201] IDAPA 58.01.01.795–799

[202] Title 18 AAC Chapter 60- Solid Waste Management

[203] ARM 17.24.101-ARM.17.24.189

[204] NRS 459.300-NRS459.370

Non-Operating Sites

A review of CERCLA sites reveals that many non-operating sites used physical processing and magnetic or gravity separation alongside other processes. Evidence indicated that waste management practices, rather than the beneficiation practices, largely contributed to environmental contamination:

- The **Ely Copper Mine** (EPA ID: VTD988366571) in Vershire, Vermont, conducted copper mining and processing from 1821 to 1920.[205] Copper ore was processed using physical techniques, with flotation and roasting activities taking place in the early 20th century. According to state and federal authorities, mine drainage and runoff from exposed tailings piles caused elevated metal concentrations in soil, surface water, and groundwater.

- The **Torch Lake** site (EPA ID MID980901946) processed copper ore for over a century in Houghton County, Michigan, beginning in 1868.[206] The site extracted copper by stamping, crushing, grinding, and driving the rock through meshes. Gravity separation further refined the crushed rock. Ammonia leaching processes began in 1916. The operators dumped both tailings and spent leaching liquor into Torch Lake, which served as a repository for tailings throughout the site's history. Approximately 200 million tons of tailings were dumped into Torch Lake during the site's years of operation. In the 1970s, tests found that Torch Lake had high concentrations of copper and other trace elements, which were attributed to waste disposal practices.

- The **Anaconda Company Smelter** site (EPA ID MTD093291656) processed copper ore from 1884 until 1980.[207] Initial steps crushed ore and used gravity separation to concentrate ore in preparation for roasting and smelting, Tailings from gravity concentration were discharged onto the floodplains of Warm Springs Creek. In the 1980s, the operator agreed to conduct remedial actions because groundwater in the vicinity of

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205 "Waste Site Cleanup & Reuse in New England: Ely Copper Mine," U.S. Environmental Protection Agency. Accessed October 28, 2015: https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0102065.

206 U.S. Environmental Protection Agency, *Superfund Record of Decision: Torch Lake, MI* (Washington, DC: U.S. Government Printing Office, 1992). Accessed October 28, 2015: http://nepis.epa.gov/Exe/ZyNET.exe/91001NR1.txt?ZyActionD=ZyDocument&Client=EPA&Index=1991%20Thru%201994&Docs=&Query=%28tailings%29%20OR%20FNAME%3D%2291001NR1.txt%22%20AND%20FNAME%3D%2291001NR1.txt%22&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&UseQField=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5CZYFILES%5CINDEX%20DATA%5C91THRU94%5CTXT%5C00000021%5C91001NR1.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=p%7Cf&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=3.

207 U.S. Environmental Protection Agency, *EPA Superfund Record of Decision: Anaconda Co. Smelter* (Washington, DC: U.S. Government Printing Office, 1994). Accessed October 28, 2015: http://www.mtech.edu/academics/clsps/ptc/sciencesocietysuperfund/pdfs/archival_materials/anaconda_archives/anaconda_rod/b_smelter.pdf.

the site contained cadmium levels that exceeded federal SDWA Maximum Contaminant Levels (MCLs).

Evidence for one site also indicated the use of physical processing and gravity separation without the use of other process chemicals. Site documents for the Pioneer Pit mine CERCLA site (EPA ID CAN000905978) did not indicate any chemical use at this site; the mine instead processed gold placer deposits using sluice boxes (gravity separation). Releases of sediment resulted from hydraulic excavation methods (which use high pressure water jets to break up stream beds), not processing activities.

Publicly available information did not directly tie known releases to these processing methods. All four non-operating sites operated before the promulgation of the CWA, which now prevents the use of the waste management practices (e.g., open dumping) and excavation methods that contributed to contamination at these sites.

Currently Operating Facilities

Little evidence was available to shed light on the incidence and types of releases from the currently operating facilities, and there is no evidence specifically tying releases to physical, magnetic or gravity separation. Because available documentation did not always discuss non-chemical processing methods, this review focused on facilities that were identified to use only physical processing and gravity or magnetic separation.

Four facilities extracted heavy mineral sands at placer operations: Iluka Resources in Virginia (MSHA IDs 4407250, 4407222, and 4407221),[208] DuPont Titanium in Florida (MSHA ID 800225), Southern Ionics North Mine in Georgia (MSHA ID 901230), and Southern Ionics South Mine in Georgia (unknown MSHA ID). These facilities did not appear to utilize chemical processes, and no evidence suggested releases of hazardous substances. At least two of these facilities (Iluka Resources and DuPont Titanium) used gravity separation, electromagnetic and electrostatic separation methods.

[208] "Heavy Mineral Sands," Virginia Department of Mines, Minerals, and Energy. Accessed July 31, 2015, at: https://www.dmme.virginia.gov/dgmr/heavyminsand.shtml.

D. Flotation Processing

Introduction

Flotation processing separates valuable minerals from waste material using differences in water-repellency, either natural or chemically induced. It is often used in conjunction with gravity concentration, and the concentrate resulting from metallic ore flotation is commonly treated by smelting. The primary environmental concerns stem from the tailings produced by flotation processes and their geochemical contents, which can result in MIW. While the CWA addresses releases to surface water directly from flotation processes, potential environmental impacts from flotation tailings are not addressed by the CWA because they are generally considered non-point sources. Instead, they are addressed by groundwater frameworks across federal and state programs.

A review of a sample of non-operating sites and currently operating mining facilities revealed several releases related to facilities that engaged in flotation processing. Causes were generally due to geochemical contaminants in flotation tailings, which resulted in discharges to groundwater or surface water.

Past and Current Use

The first documented use of flotation occurred in 1877 for the processing of graphite from ores. Until about 1920, flotation was a relatively inefficient process requiring large quantities of oil or fatty materials to cause the desired separation. During this period, the primary reagents used for flotation included oils, soaps, ketones, esters, aldehydes, lime and soda ash. Over time, chemicals employed in other industries were adapted for use in flotation processing of mineral ore, substantially decreasing the amount of reagent necessary for separation and making the process more effective. Primary reagents used for flotation during the period from 1921 to 1950 included xanthate, chelating agents, fatty acids, petroleum sulfonates and primary amines.

By 1950, reagents developed for targeted application in flotation increased the use of the process to more ores and minerals.[209] Flotation is commonly used now, including during concentration of antimony, cobalt, copper, gold-silver, iron, lead-zinc, nickel, molybdenum, phosphate ores and platinum group metal.[210,211]

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[209] D. Fuerstenau, "A Century of Developments in the Chemistry of Flotation Processing," in *Froth Flotation: A Century of Innovation*, eds. Maurice C. Furstenau, Graeme Jameson, and Roe-Hoan Yoon (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2007).

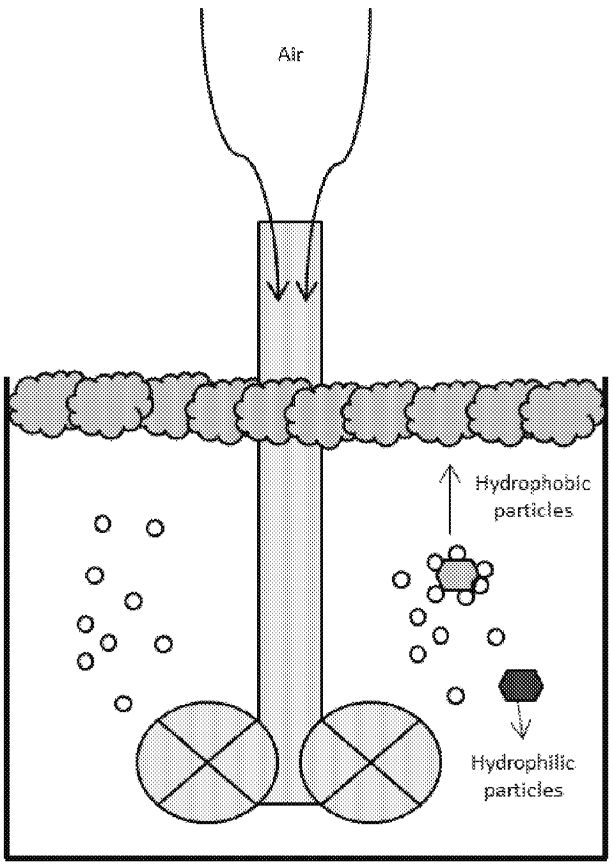
[210] Corby G. Anderson, "The Metallurgy of Antimony," *Chemie Der Erde – Geochemistry* 72 (2012), p. 3-8.

[211] F.K. Crundwell, *Extractive Metallurgy of Nickel, Cobalt and Platinum Group Metals* (Amsterdam: Elsevier, 2011).

Technical Description

Flotation sorts material based on differences in hydrophobicity (water repellency), either inherent or chemically induced. In most cases, the ore must undergo initial processing such as crushing to create distinct grains of valuable mineral and waste material. Ore particles are mixed with water in a slurry, which then goes through flotation cells that agitate the slurry and produce microscopic air bubbles. Chemicals are added that make the desired mineral hydrophobic (water-repelling). As bubbles travel up through the slurry, air attaches to the hydrophobic mineral particles and they float to the top. The concentrated froth layer can then be removed. The hydrophilic (water-loving) waste particles remain in the liquid, where they are transported to the tailings facility.[212] This process is illustrated in Exhibit 1.D.1.

Exhibit 1.D.1. Simplified Flotation Cell[213]



[212] S. Kawatra, "Chapter 14.5: Fundamental Principles of Froth Flotation," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, 2011), Volume 2.

[213] Adapted from S. Kawatra, "Chapter 14.5: Fundamental Principles of Froth Flotation," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, 2011), Volume 2.

Flotation is a versatile process that can separate minerals with a range of particle densities.[214] In addition, a variety of chemical reagents allow flotation to work even with ores that are not naturally hydrophobic.

Flotation processes use six categories of reagents: frothers, collectors, modifiers, flocculants, activators and depressants. Frothers control bubble size and ensure that the froth layer at the top is stable. Collectors control the hydrophobicity of the components, such as an oil that bonds only with the surface of a particular mineral, rendering those particles hydrophobic. The remaining types of reagents help create optimal conditions for selective separation by influencing the way that collectors attach to mineral surfaces – for example, by controlling pH or modifying the way that collectors adhere to specific mineral surfaces.[215] Some commonly used reagents are shown in Exhibit 1.D.2.

Exhibit 1.D.2. Common Reagents Associated with Flotation Processing[216]

FROTHERS	COLLECTORS	DEPRESSANTS	FLOCCULANTS
Aliphatic Alcohol Pine Oil Polyglycol Ether	Xanthates Dithiophosphates Thionocarbamates Cyanide Salt Kerosene	Cyanide Lime	Aluminum Salts Anionic Polyacrylamide

Potential Sources of Hazardous Substances

Flotation processes generate tailings that consist of a mixture of waste material and the remaining liquid, which consists mostly of water and any remaining reagents. These are generally pumped to a tailings impoundment, where solids are settled out of the solution.[217, 218, 219]

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[214] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[215] S. Kawatra, "Chapter 14.5: Fundamental Principles of Froth Flotation," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, 2011), Volume 2.

[216] S. Kawatra, "Chapter 14.5: Fundamental Principles of Froth Flotation," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, 2011), Volume 2.

[217] U.S. Environmental Protection Agency, Office of Solid Waste, Special Waste Branch, *Technical Resource Document: Extraction and Beneficiation of Ores and Minerals* EPA 530-r-94-013, Volume 4: Copper (Washington, DC: U.S. Government Printing Office, 1994).

[218] U.S. Environmental Protection Agency, Office of Solid Waste, Special Waste Branch, *Technical Resource Document: Extraction and Beneficiation of Ores and Minerals* EPA 530-r-94-013, Volume 1: Lead-Zinc (Washington, DC: U.S. Government Printing Office, 1994).

[219] U.S. Environmental Protection Agency, Office of Solid Waste, Special Waste Branch, *Technical Resource Document: Extraction and Beneficiation of Ores and Minerals* EPA 530-r-94-013, Volume 3: Iron (Washington, DC: U.S. Government Printing Office, 1994).

In some cases, reagents have the potential for environmental harm. Of the reagents shown in Exhibit 1.D.1., some (e.g., pine oil, anionic polyacrylamide) are relatively benign. In contrast, cyanide, certain aluminum salts, certain aliphatic alcohols, glycol ether and lime are CERCLA hazardous substances.[220] Xanthates (often used as collectors for copper, nickel, lead, zinc, silver, and gold) are not listed as CERCLA hazardous substances, but can be toxic to freshwater fish and invertebrates.[221] Xanthates have also been known to have negative effects on soil biota, including the inhibition of nitrogen transformation and nitrite oxidization.[222]

Most of these reagents are consumed during flotation, with only small residual quantities making it into the tailings.[223] Facilities may dispose of wastes from various processes in the same waste management units, however, with the resulting mixture containing more hazardous constituents than tailings from flotation alone.[224]

Proper construction of tailings ponds allows potential contaminants to settle out of water before it discharges. When chemicals are added to the slurry, leak detectors and linings must be employed to ensure that no harmful substances are discharged to the environment.[225,226, 227] The primary method of managing environmental discharges from tailings is to pump the mineral slurries to tailings ponds, where the solids settle to the bottom and consolidate, allowing the cleaned liquid above to be recycled to the plant or discharged. See Section 2.C. for more details on tailings management.

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220 "EPCRA/CERCLA/CAA Section 112(r) Consolidated List of Lists," U.S. Environmental Protection Agency, updated March 2015. Accessed November 3, 2015, at: http://www2.epa.gov/epcra/epcracerclacaa-ss112r-consolidated-list-lists-march-2015-version; and "CERCLA Substance Priority List," ATSDR, updated 2013. Accessed November 3, 2015 at: http://www.atsdr.cdc.gov/spl/.

221 M.C. Fuerstenau, *The Toxicity of Selected Sulfhydryl Collectors to Rainbow Trout* (Rapid City, Bureau of Mines Open File Report 11-75 (Rapid City, SD: South Dakota School of Mines & Technology, 1974).

222 J. Ashworth, G.A. Rodgers, and G.G. Briggs, "Xanthates as inhibitors of fertilizer nitrogen transformation in soil," *Chemistry and Industry* 3 (1979), p. 90-92.

223 J.R. Hawley, *The Use, Characteristics and Toxicity of Mine-mill Reagents in the Province of Ontario* (Toronto: Ministry of the Environment, 1972).

224 U.S. Environmental Protection Agency, *Mineral Processing Facilities Placing Mixtures of Exempt and Non-Exempt Wastes in On-site Waste Management Units: Technical Background Document Supporting the Supplemental Proposed Rule Applying Phase IV Land Disposal Restrictions to Newly Identified Mineral Processing Wastes* (Washington, DC: U.S. Government Printing Office, 2013).

225 D. Dahlstrom, "Chapter 14.7: Dewatering Methods," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011).

226 For more details on the construction of tailings ponds in regards to specific site and tailings characteristics, see D. Van Zyl, J. Johnson, "Chapter 8.5: Tailings Disposal Design," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997).

227 D. Dahlstrom, "Chapter 14.7: Dewatering Methods," in *SME Mining Engineering Handbook*, Third Edition, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011).

State and Federal Regulations

While few regulations pertain specifically to flotation processing and its waste products, the CWA, state groundwater programs, hardrock mining, and solid waste regulatory frameworks address these practices at the state and federal level. Section 2.C.4. describes the regulatory framework for tailings in more detail.

Federal Regulations

Potential releases from flotation processing are regulated under the ELGs outlined by the CWA for many minerals, including gold, silver, copper, lead and titanium.[228] These requirements set discharge limits and water quality requirements for direct discharges to surface water from flotation operations for sediment, metals and pH. Runoff from tailings impoundments may be regulated under stormwater permits.[229] Stormwater permits regulate stormwater contaminated by contact with material from mining activities.

While RCRA does not directly address tailings from flotation processing (a beneficiation waste under the Bevill exclusion), state and local governments implement solid waste management guidelines under RCRA Subtitle D. Specifically, the federal government provides information and policy guidance to support state and local governments, such as criteria for the safe re-use of tailings in other industrial applications.[230] In situations where facilities combine tailings with mineral processing wastes that exhibit hazardous characteristics, the waste mixtures may also fall under RCRA Subtitle C regulations. MSHA also specifies inspections and safety standards for impoundments, retention dams and tailings ponds, and the FEMA is charged with administering a national dam safety program that includes tailings structures.[231]

Mining operations on federal land are subject to additional regulation. According to BLM Section 3809 rules, mining operations must prevent unnecessary or undue degradation, which includes managing all tailings and any other waste produced from mining operations.[232] Tailings from flotation processing fall under this general regulation as waste produced by mining operations and are thus subject to the permitting and approval requirements for operations on BLM lands.

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[228] 40 CFR 436 (mineral mining and processing); 40 CFR 440 (ore mining and dressing).

[229] The classification of point and nonpoint discharges from mining operations has evolved over time. For more information regarding current definitions of point sources from mining operations, see: *Greater Yellowstone Coalition v. Lewis*, 628 F.3d 1143 (9th Cir. Dec 23, 2010)

[230] U.S. Environmental Protection Agency, *Final Rule: Criteria for the Safe and Environmentally Protective Use of Granular Mine Tailings Known as "Chat"* Docket EPA-HQ-RCRA-2006-0097 (Washington, DC: U.S. Government Printing Office, 2007).

[231] 30 CFR Part 57, Subpart S. For more information, see: "Dam Safety Standards and Technical Guidance," MSHA. U.S. Department of Labor. Accessed October 30, 2015 at: http://www.msha.gov/DamSafety/DamSafetyTechGuidance.asp.

[232] 43 CFR Part 3809

State Regulations

Several state regulations manage tailings through state environmental programs, state mining regulatory programs, solid waste management programs, or dam safety regulations. For example:

- **Alaska**'s Department of Environmental Conservation Solid Waste Disposal Permit makes tailings from hardrock mines and tailings from placer mines that have been amalgamated or chemically treated subject to the state's solid waste management general standards and requirements, which usually necessitate pre-operation, operation, and post-closure monitoring.[233]
- **Arizona's** Groundwater Permit requires mines in active groundwater management areas to reduce water loss from tailings impoundments.[234] As a result, water removed from tailings is usually recycled back into industrial processes.
- **California** manages mining wastes through the state's Porter-Cologne Water Quality Control Act. All mining units, including tailings structures, must comply with siting and construction standards. Disposal and management regulations for mining waste establish monitoring, closure, and maintenance requirements, which are based on wastes' potential hazard to water.[235]
- **Idaho's** Dam Safety Program regulates tailings structures through dam and impoundment structure requirements. The state oversees the construction, enlargement, alteration, repair, operation, and maintenance of dams and impoundments.[236]
- **Montana**'s Hard Rock Mining Reclamation Act specifies that milling operations are subject to permitting, requiring a detailed description of the design, construction, and operation of the mill, tailings, and waste rock disposal facilities, and best management practices are expected in the disposal of tailings and other waste.[237]

Non-Operating Sites and Currently Operating Facilities

Non-Operating Sites

Eight of the 29 non-operating mining and processing CERCLA sites reviewed used flotation processing techniques.[238] The causes of releases were identified for six of the eight CERCLA

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233 Title 18 AAC Chapter 60- Solid Waste Management

234 ARS §45

235 27 CCR Div. 7.1

236 Idaho Code 42-17; IDAPA 37.06.06; IDAPA 37.03.05

237 ARM 17.24.101-ARM.17.24.189

238 Cyprus Tohono Mine (EPA ID AZD094524097), Captain Jack Mill (EPA ID COD981551427), Summitville Mine (EPA ID COD983778432), Bunker Hill Mining & Metallurgical Complex (EPA ID IDD048340921), Blackbird Mine (EPA ID IDD980725832), Li Tungsten Corp. (EPA ID NYD986882660), Tar Creek (Ottawa County) (EPA ID OKD980629844), Gilt Edge Mine (EPA ID SDD987673985).

sites that used flotation, although there is no indication that the releases at these sites were directly caused by flotation processing. Some releases were influenced by waste management practices, such as tailings storage facility failures.

The review identified one non-operating, non-CERCLA site that directly released flotation solution, with minimal evidence of long-term environmental impacts. The Jamestown Mine in Tuolomne County, California (MSHA ID 0404695) began gold mining and processing operations in 1986. In 1987, the flotation operations released 500 gallons of flotation solution into the area adjacent to a processing building, with 200 gallons released into a sediment pond. Test samples taken the day of the release indicated that concentrations of the flotation compounds were below detectable levels.[239]

Currently Operating Facilities

At least fifteen of 70 currently operating facilities reviewed use flotation as a method for mineral processing.[240] Copper is mined at five of these sites.[241] At least 13 of the 15 facilities experienced hazardous substance releases, but little evidence was available concerning the causes and types of releases, including whether the release was associated with the flotation process.

The review identified one currently operating facility that directly released flotation solution in violation of the facility's water quality permit. The Robinson Nevada Mining Company operates the Robinson Operation surface mine (MSHA ID 2601916) in White Pine County, Nevada. The facility produces gold and copper using flotation processes.[242] The facility released copper flotation tailings five times in 1996, leading to violations of its water pollution control permit.[243] Releases ranged from 1,500 gallons to 66,000 gallons per release. The largest spill, on February 12, 1996, contaminated 2.3 miles of a downstream drainage bed. This release violated the Nevada Revised Statutes 445A.465 law regarding discharges of injection fluids or pollutants.

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[239] U.S. Environmental Protection Agency, Office of Solid Waste, *Human Health and Environmental Damages from Mining and Mineral Processing Wastes* (Washington, DC: U.S. Government Printing Office, 1995). Accessed December 7, 2015, at: http://www3.epa.gov/epawaste/nonhaz/industrial/special/mining/minedock/damage/damage.pdf.

[240] Asarco Ray (MSHA ID 0200150), Ashdown (MSHA ID 2600578), Coeur Kensington (MSHA ID 5001544), Freeport McMoRan Morenci (MSHA ID 0200024), Hecla Greens Creek (MSHA ID 5001267), Intrepid Potash East/West (MSHA IDs 2900175 (West) and 2900170 (East)), Mosaic South Pasture Hardee (MSHA ID 0800903), Nyrstar East Tennessee Complex-Young (MSHA ID 4000170), Nyrstar Middle Tennessee Complex- Elmwood/Gordonsville (MSHA ID 4000864), Rio Tinto Kennecott Bingham Canyon-Copperton-Magna (MSHA IDs 4200149 and 4201996), Robinson Nevada (MSHA ID 2601916), Stillwater East Boulder (MSHA ID 2401879), Stillwater Stillwater/Columbus (MSHA ID 2401490), Thompson Creek (MSHA ID 1000531), US Silver Galena (MSHA ID 1000082)

[241] Asarco Ray (MSHA ID 0200150), Freeport McMoRan Morenci (MSHA ID 0200024), Rio Tinto Kennecott Bingham Canyon-Copperton-Magna (MSHA IDs 4200149 and 4201996), Robinson Nevada (MSHA ID 2601916), US Silver Galena (MSHA ID 1000082)

[242] "Robinson Mine," KGHM Polska Miedz. Accessed October 27, 2015: http://kghm.com/en/our-business/mining-and-enrichment/robinson.

[243] U.S. Environmental Protection Agency, *Damage Cases and Environmental Releases from Mines and Mineral Processing Sites* (Washington, DC: U.S. Government Printing Office, 1997).

The smaller spills contaminated small areas of soil. Information about long-term environmental effects and regulatory enforcement actions was not readily available.

E. Cyanidation

Introduction

In cyanidation, cyanide is used to separate gold or silver from its ore. This beneficiation process dissolves gold and silver from ore, separating it from waste material (tailings or spent heap). The cyanide solution containing gold and silver is then processed on site by carbon adsorption or by zinc precipitation (Merrill-Crowe process) to produce doré metal, a semi-pure mixture of gold and silver. Cyanidation is typically performed using either agitated tank or heap leaching processes.[244]

Cyanide leaching generates most of the gold produced in the United States and worldwide. Leaching tanks, leach pads, piping, and storage facilities (e.g., process solution ponds, tailings facilities) can release cyanide and other mobilized contaminants into the environment, however, at both active and abandoned mines. Coincident with increased regulatory requirements, mitigation and best management practices have evolved in an effort to control the risk of these releases and better mitigate their impacts.

Nevertheless, substantial releases of cyanide have been observed both historically and as a result of contemporary mining practices, suggesting that technological advances and regulatory oversight may have not eliminated the potential for serious environmental contamination. Limited evidence from the literature and several Superfund sites also suggests that financial health of mining firms may play a role in site operations and the incidence of releases, with volatile metal commodity prices a key determinant of a mining company's bottom line.

Past and Current Use

Cyanidation is the predominant mineral processing method currently in use in the United States to process gold ores, as well as to recover byproduct silver contained in most gold ores.[245]

Agitated tank leaching processes have been in use in the United States since 1891, with heap leaching and carbon adsorption processes emerging in the 1970s.[246] Heap leaching systems are typically used for treatment of low-grade oxidized ores, with their use increasing during periods of high commodity prices. Because of lower capital costs, heap leaching is used when agitated

[244] John Marsden, and Iain House, *The Chemistry of Gold Extraction*, Second Edition (Englewood, CO: Society for Mining, Metallurgy and Exploration, 2006).

[245] John Marsden, and Iain House, *The Chemistry of Gold Extraction*, Second Edition (Englewood, CO: Society for Mining, Metallurgy and Exploration, 2006).

[246] John Marsden, and Iain House, *The Chemistry of Gold Extraction*, Second Edition (Englewood, CO: Society for Mining, Metallurgy and Exploration, 2006).

tank leaching processes are not cost effective.[247,248] While used throughout the United States, this process is predominant in Nevada, where ores are more amenable to heap leaching methods.[249]

In 1991, all forms of cyanidation produced 90 percent of the gold produced in the United States. Of that amount, 33 percent was produced by heap leaching and 56 percent was produced by tank leaching.[250] Updated statistics on the current use of cyanidation by the U.S. mining industry are not available.

Technical Description

Two main types of cyanide leaching systems process ore at currently operating facilities: agitated tank leaching, and heap leaching. Preliminary steps to prepare and make the ore more amenable to cyanidation include physical processing (e.g., crushing, grinding, and sizing, described in Section 1.C.), flotation (discussed in Section I.D. of this document), and oxidation (e.g., roasting, described in Section I.G.). During and after leaching, the two most common recovery processes used to remove gold and other metals from the cyanide solution are: 1) carbon adsorption, desorption, and electrowinning; and 2) the Merrill-Crowe method (zinc precipitation). The resulting intermediate product is further refined by smelting, and in most cases the cyanide solution is recycled. These ancillary processes are addressed within the following sections on agitated tank and heap leaching.

Agitated Tank Leach

Exhibit 1.E.1. presents the agitated tank leaching process. The standard agitated tank cyanide leach process consists of crushing and then grinding the ore to roughly the consistency of fine sand. Alternatively, concentrate from flotation processing, which uses chemical reagents and air bubbles to separate minerals of interest, may also be used as feed to the agitated tank cyanide leach process. The ground ore or concentrate is combined with water, sodium cyanide, and quick lime (to maintain the alkalinity of the solution), and passed through a series of agitated mixing tanks with a residence time of 24 hours.[251] Dissolved gold and silver are collected with activated carbon (carbon-in-pulp adsorption or carbon-in-leach processing), thickener tanks, vacuum

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[247] John Marsden, and Iain House, *The Chemistry of Gold Extraction*, Second Edition (Englewood, CO: Society for Mining, Metallurgy and Exploration, 2006).

[248] Dump leaching is a rarely used third type of cyanidation in which uncrushed ore or waste rock is stacked in a pile, sometimes without a liner. This process requires even less capital investment, but requires increased processing time and results in a lower recovery rate. However, some technical descriptions use the terms "heap leaching" and "dump leaching" interchangeably. This document describes and refers to the two main types of cyanidation: agitated tank leaching and heap leaching.

[249] Daniel Kappes, "Precious Metal Heap Leach Design and Practice," in *Mineral Processing Plant Design, Practice, and Control Proceedings*, ed. Andrew L. Mular (Englewood, CO: Society for Mining, Metallurgy, and Exploration, 2002). Accessed August 27, 2015, at: http://www.kcareno.com/pdfs/mpd_heap_leach_desn_and_practice_07apr02.pdf.

[250] Carlos D. Da Rosa, James S. Lyon, and Philip M. Hocker, *Golden Dreams, Poisoned Streams: How Reckless Mining Pollutes America's Waters, and How We Can Stop It* (Washington, DC: Mineral Policy Center, 1997).

[251] John Marsden, and Iain House, *The Chemistry of Gold Extraction*, Second Edition (Englewood, CO: Society for Mining, Metallurgy and Exploration, 2006).

filters, or zinc precipitation.[252] Electrowinning, which uses electric currents to further separate metals, and smelting then produce doré metal, a semi-pure mixture of gold and silver. Mercury, which is commonly present in gold ores, is removed as a byproduct.[253]

Heap Leaching

Exhibit 1.E.2. shows the cyanide heap leaching process. Unprocessed, crushed, or agglomerated (pelletized) ore is placed on a leach pad on an impermeable barrier.[254] Water-based cyanide leach solution is applied to heap leach piles using sprinklers or misters. After passing through the pile of ore and dissolving precious metals, the gold- and silver-containing (pregnant) cyanide solution is collected in a solution pond or in a valley-fill containment. Metal from cyanide heap leaching processes is recovered using activated carbon or, if the ore is high in silver content, by zinc precipitation. The recycled cyanide solution is then reapplied to the ore stack. Similar to agitated tank leaching, electrowinning and smelting then produce doré metal, with mercury removed as a byproduct.[255]

Heaps can be constructed on flat ground (the most common type of heap-leach design), or can be placed in fairly steep-walled valleys with side slopes up to 20 percent.[256] "Such valley-fill heap leach facilities, which store metal-bearing cyanide solution, dam natural valleys and reduce evaporation. Although the best design practice is to minimize pressure and prevent leakage by minimizing the depth and height of the solution, valley-fill designs store solutions at depths creating significant pressure.

Generally, heap leach systems incorporate impermeable liners to maximize metal recovery and prevent leakage into the environment.[257] Almost all gold heap-leach facility designs operate on a zero-discharge basis and include the following components: a low-permeability compacted soil or geosynthetic clay under-layer; a leak detection layer; a plastic or geomembrane liner; a

[252] John Marsden, and Iain House, *The Chemistry of Gold Extraction*, Second Edition (Englewood, CO: Society for Mining, Metallurgy and Exploration, 2006).

[253] John Marsden, and Iain House, *The Chemistry of Gold Extraction*, Second Edition (Englewood, CO: Society for Mining, Metallurgy and Exploration, 2006).

[254] Ores with small particle size must sometimes be prepared before other processes such as smelting or leaching can be conducted. Agglomeration binds together fine-grained materials that can prevent the efficient flow of solution through the leach pile. Commonly, cement, lime, or other binding and neutralizing agents create larger ore particles. This creates pellets, briquettes or nodules which can be more easily refined using other processes.

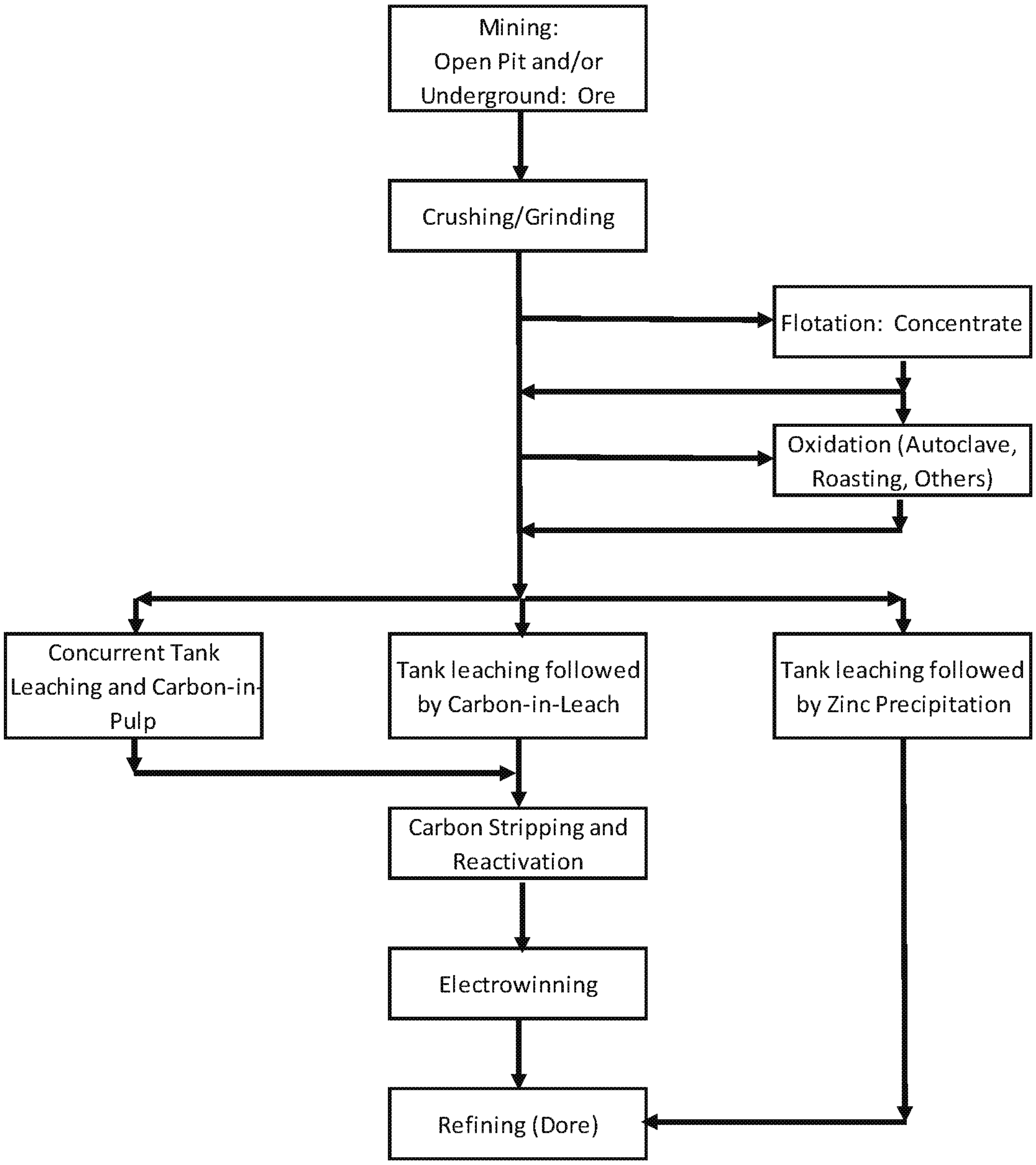
[255] Daniel Kappes, "Precious Metal Heap Leach Design and Practice," in *Mineral Processing Plant Design, Practice, and Control Proceedings*, ed. Andrew L. Mular (Englewood, CO: Society for Mining, Metallurgy, and Exploration, 2002).

[256] John Marsden and Iain House, *The Chemistry of Gold Extraction*, Second Edition (Englewood, CO: Society for Mining, Metallurgy and Exploration, 2006).

[257] Donald I. Bleiwas, *Estimated Water Requirements for Gold Heap-Leach Operations*, Open-File Report 2012-1085, Version 1.1 (Washington, DC: U.S. Government Printing Office, 2012). Accessed September 4, 2015, at: http://pubs.usgs.gov/of/2012/1085/pdf/ofr2012-1085_v1-1.pdf

geotextile cover to prevent damage to the plastic liner; drain pipes, and a crushed gravel cover to protect the pipes and liner and provide a permeable base below the heaped ore.[258]

Exhibit 1.E.1. Agitated Tank Cyanide Leaching Processes Flowsheet[259]



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[258] Daniel Kappes, "Precious Metal Heap Leach Design and Practice," in *Mineral Processing Plant Design, Practice, and Control Proceedings*, ed. Andrew L. Mular (Englewood, CO: Society for Mining, Metallurgy, and Exploration, 2002).

[259] Adapted from John Marsden and Iain House, *The Chemistry of Gold Extraction*, Second Edition (Englewood, CO: Society for Mining, Metallurgy and Exploration, 2006).

Potential Sources of Hazardous Substances

The management of environmental and public safety risks from cyanide use in mining remains a subject of debate in the scientific and engineering communities.[260] In addition to the release of cyanide, discharges from cyanidation processes both during operations and after closure can also contain potentially toxic elements including lead, cadmium, copper, arsenic, and mercury.[261,262]

Because cyanides break down in sunlight, the major environmental impacts occur from the immediate toxicity. In air and surface water, free cyanide typically degrades into non-toxic forms because of volatilization (vaporization), complexation (binding with other substances) and biological degradation.[263] The chemical is much more persistent in groundwater, though. Cyanide toxicity inhibits respiration in fish, birds, and mammals that are exposed via water or air. Accidental releases of cyanide-containing effluent from mining operations, both in the United States and internationally, have resulted in fish kills and other severe shocks to aquatic ecosystems.[264] Humans exposed to high levels of cyanide gas over a short time can experience comas, as well as damage to the brain and heart, sometimes resulting in fatality.

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[260] See, for example: T. Mudder and M. Botz, "Cyanide and society: a critical review," *The European Journal of Mineral Processing and Environmental Protection* 4 (2002), p. 62-74; J.J. Latios, "Cyanide, Mining, and the Environment," *Pace Environmental Law Review* 30 (2013), p. 869-949; R. Eisler and S. Wiemeyer, "Cyanide Hazards to Plants and Animals from Gold Mining and Related Water Issues," *Rev Environ Contam Toxicol* 183 (2004), p. 21-54; and Gavin Hilson and A.J. Monhemius, "Alternatives to cyanide in the gold mining industry: what prospects for the future?," *Journal of Cleaner Production* 14:12-13 (2006), p.1158-1167.

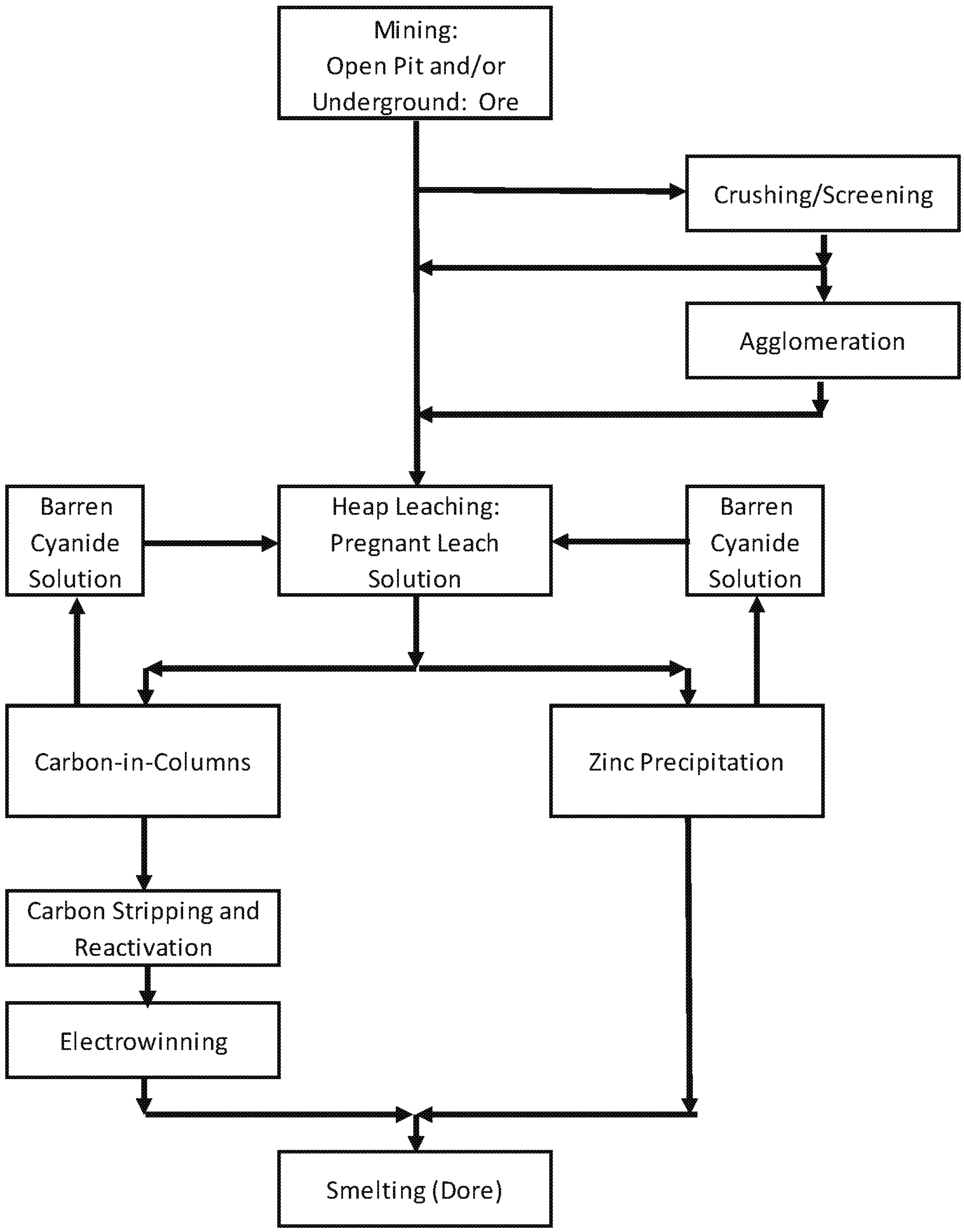
[261] R. Eisler and S. Wiemeyer, "Cyanide Hazards to Plants and Animals from Gold Mining and Related Water Issues," *Rev Environ Contam Toxicol* 183 (2004), p. 21-54.

[262] See The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009); J.L. Jambor, D.W. Blowes, and A.I.M. Ritchie, eds., *Environmental Aspects of Mine Wastes*, Short Couse Handbook, Vol. 31 (Québec: Mineralogical Association of Canada, 2003); K.A., Lapakko, "Regulatory mine waste characterization: A parallel to economic resource evaluation," in *Proceedings of the Western regional Symposium on Mining and Mineral Processing Waters*, ed. F. Doyle (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc.,1990), p. 31-39; and R.W. Lawrence, "Prediction of the behaviour of mining and processing wastes in the environment," in *Proceedings of the Western regional Symposium on Mining and Mineral Processing Waters*, ed. F. Doyle (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc.,1990), p. 115-121.

[263] J.J. Latios, "Cyanide, Mining, and the Environment," *Pace Environmental Law Review* 30 (2013), p. 869-949.

[264] J.J. Latios, "Cyanide, Mining, and the Environment," *Pace Environmental Law Review* 30 (2013), p. 869-949.

Exhibit 1.E.2. Cyanide Heap Leaching Processes Flowsheet[265]



[265] Adapted from John Marsden and Iain House, *The Chemistry of Gold Extraction*, Second Edition (Englewood, CO: Society for Mining, Metallurgy and Exploration, 2006).

Cyanide leaching processes create wastes that can present risks of releases of hazardous substances such as cyanide, cyanide-metal complexes, and metals via groundwater and surface water routes. [266] MIW (e.g., acid, alkaline, or neutral mine drainage), runoff originating from exposed heap leach piles or tailings is also a distinct risk associated with this practice (for more information regarding tailings management, see Section 2.C.).[267] Exhibit 1.E.3. discusses these types of potential releases in more detail.

State and Federal Regulations

Current operations are subject to substantially more comprehensive regulatory requirements relative to past operations, where discharges and abandonment were common. At both the federal and state level, land management and environmental regulations address potential environmental risks from gold mining and primary processing, including the practices and potential release risks identified above.

Mining and processing operations may be subject to preliminary environmental planning and assessment, operational requirements and performance standards, and reclamation requirements.

Federal Regulations

Federal agencies have promulgated rules regarding cyanide leaching operations under mining regulations. These include:

- **Solid Waste:** RCRA Subtitle C generally excludes extraction and beneficiation wastes, and many mineral processing wastes, from regulation as hazardous waste. Tailings and mine wastewater containing cyanide are exempt from RCRA Subtitle C under the Bevill Amendment as beneficiation wastes. During the 1998 rulemaking for the RCRA Phase IV Land Disposal Restrictions, EPA confirmed that cyanide-bearing wastes generated from beneficiation processes were not regulated under Subtitle C.[268] Many currently operating gold mines maintain RCRA Subtitle C permits for hazardous wastes unrelated to cyanide.

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[266] U.S. Environmental Protection Agency, Office of Solid Waste, Special Waste Branch, *Technical Resource Document: Extraction and Beneficiation of Ores and Minerals* EPA 530-r-94-013, Volume 2: Gold (Washington, DC: U.S. Government Printing Office, 1994).

[267] Mine runoff can result from a number of mining and processing features, including exposed rock tunnels and waste rock tunnels. This issue is not unique to cyanidation practices. Although this process occurs naturally, mining exposes increased quantities of waste rock and tailings to rainwater, snowmelt, and surface water. Acidic drainage reduces the pH levels of surrounding aquatic ecosystems, threatening aquatic life and vegetation, and drainage of any pH level can contain mobilized contaminants.

[268] 63 Federal Register 28556. Vol. 63, No. 100, 28556. May 26, 1998.

Exhibit 1.E.3. Potential Releases Associated with Cyanidation and Ancillary Processes

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
Solution from tanks or heap leach piles	Cyanide leaching uses one or combination of the following process chemicals: sodium cyanide, potassium cyanide, sodium hydroxide, nitric acid, and lime, as well as other process chemicals. Process chemicals may be discharged accidentally from drums, tanks and other storage containers during operations and post-closure if not properly disposed. Leaks may also occur from the leaching system itself, such as from heap leach pad liner punctures. Valley-fill heap leach designs create a high risk of solution leakage and storage issues, because of the high fluid pressures associated with tailings dams.[269] Cyanide solution without leached minerals, as well as process water recovered from tailings and heap leach facilities, is recycled back to the agitated tank cyanide leaching process. In addition to cyanide, the leach solutions accumulate metal impurities. Discharges of leach solutions may occur as a result of leakage of ponds, tanks, and piping during operations and may also be responsible for long-term post-closure seepage containing cyanide and metals.[270]	There are a multitude of liner systems and designs that can be applied. The combination of the design and the materials will determine the leakage rate of the liner system.[271] Liner systems can be designed and constructed with leak detection alarm systems and fluid recovery systems. Leak collection systems can be constructed between primary and secondary synthetic liners to collect and remove fluids from leaks, minimizing the pressure on the secondary liner. Fluid collection pipes can transmit fluid away from drainage layers.
Leach tailings	Following cyanidation processing, the spent ore or tailings is discharged to a tailings storage facility (impoundment). These wastes are typically treated to reduce the cyanide concentration, but may contain residual cyanide and cyanide complexes. They may also contain metals present in the ore body.[272] The waste	During mine design, targeted extraction techniques such as selective mining and avoidance could be used to minimize mining of ore resulting in leach tailings that could result in MIW.[273] As part of the leach tailings disposal facility design

[269] Daniel Kappes, "Precious Metal Heap Leach Design and Practice," in *Mineral Processing Plant Design, Practice, and Control Proceedings*, ed. Andrew L. Mular (Englewood, CO: Society for Mining, Metallurgy, and Exploration, 2002).

[270] Daniel Kappes, "Precious Metal Heap Leach Design and Practice," in *Mineral Processing Plant Design, Practice, and Control Proceedings*, ed. Andrew L. Mular (Englewood, CO: Society for Mining, Metallurgy, and Exploration, 2002).

[271] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.6.1.

[272] Bernd Lottermoser, *Mine Wastes: Characterization, Treatment and Environmental Impacts*, 3rd Edition (Medford, MA: Springer Science and Business Media, 2010).

[273] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.1.

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
	impoundment may be unlined or lined, and in either case might incorporate a collection or pumpback system for recovery of escaped tailings solution. See Section 2.C. for further discussion of tailings management.	engineered barriers such as a liner can be utilized to collect seepage from tailings resulting in reduced seepage management requirements.[274] Another technique is production of paste or dry dewatered leach tailings to reduce potential for MIW.[275] During operations special handling techniques such the addition of alkaline materials or amendments can be used to reduce potential for AMD from leach tailings.[276] At closure leach tailings areas can be reclaimed using dry and wet covers to lessen or minimize discharges of MIW.[277]
Mine drainage	Water percolating through uncovered or otherwise exposed tailings or heap leach piles may react with sulfide minerals, creating acid drainage and other MIW. Depending on the hydrology of the site, the drainage may be discharged to groundwater or surface water. A variety of factors affect the rate of MIW generation from tailings including the water level within the pile, exposure to oxygen, and the presence of bacteria. Tailings and ore piles are susceptible to acid generation because of the increased surface area exposure of minerals not extracted by the cyanide leaching process. Both surface water discharges and seepage to groundwater from tailings impoundments may contain MIW which also increases the leaching and mobility of metals.[278]	In the event the mine drainage requires treatment prior to discharge, either during operations or post-closure, a variety of active, passive and in situ mine drainage treatment techniques are potentially applicable.[282]

[274] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.6.1.

[275] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.8.

[276] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.4.2.

[277] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.3.2.

[278] U.S. Environmental Protection Agency, Office of Solid Waste, Special Waste Branch, *Technical Resource Document: Extraction and Beneficiation of Ores and Minerals* EPA 530-r-94-013, Volume 2: Gold (Washington, DC: U.S. Government Printing Office, 1994).

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
	Nevada contains most of the current U.S. gold operations.[279] A 2003 USGS study of hydrological and geological conditions of northern Nevada found that mines in Nevada are much less likely than those in other states to discharge acid waters to local waterways because of low precipitation, the isolated nature of local waterways, composition of ores, and prevalence of soils containing neutralizing lime.[280] Risks from seasonal precipitation still exist, however, and there are several documented instances of AMD contamination from currently operating Nevada gold mines.[281]	
Mercury releases	Gold ore processing and production facilities are the seventh largest source of mercury air emissions in the United States.[283] Mercury commonly occurs in gold-bearing ore and is a relatively volatile element. As such, it can escape to the atmosphere, particularly from thermal processes. Mercury releases can occur as a result of various cyanidation steps.[284,285] They include preliminary roasting and autoclaving, carbon regeneration, electrowinning, mercury distillation and recovery, and doré furnace smelting. Atmospheric mercury	As part of mine design targeted extraction techniques such as selective mining and avoidance could be used to minimize mining of waste rock that could result in mercury releases.[287] Releases can be reduced using a hypochlorite injection system and by improving process and control equipment efficiency.[288]

[282] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 7.5.

[279] U.S. Environmental Protection Agency, Office of Solid Waste, Special Waste Branch, *Technical Document: Acid Mine Drainage Prediction* EPA 530-R-94-036 (Washington, DC: U.S. Government Printing Office, 1994). Accessed August 13, 2015, at: https://www.epa.gov/sites/production/files/2015-09/documents/amd.pdf

[280] J.T. Nash, *Overview of Mine Drainage Geochemistry at Historical Mines, Humboldt River Basin and Adjacent Mining Areas, Nevada*, USGS Bulletin 2210-E (Washington, DC: U.S. Government Printing Office, 2003). Accessed August 13, 2015, at: http://pubs.usgs.gov/bul/b2210-e/B2210E508V6.pdf

[281] Ronald Eisler, *Biogeochemical, Health, and Ecotoxicological Perspectives on Gold and Gold Mining* (Boca Raton: CRC Press, 2010).

[283] "Fact Sheet: Final Rule to Reduce Mercury Emissions from Gold Mine Ore Processing and Production Sources," U.S. Environmental Protection Agency, updated 2010. Accessed February 13, 2015, at http://www.epa.gov/ttn/atw/area/gold_mines_fs_121610.pdf; and EPA. 2010. National Emission Standards for Hazardous Air Pollutants: Gold Mine Ore Processing and Production Area Source Category; and Addition to Source Category List for Standards. 40 CFR Part 63 Subpart EEEEEEE. 76 FR 9450.

[284] Glenn Miller, "Byproduct Mercury Production in Modern Precious Metals Mines in Nevada," presented at EPA Region 8: 2007 Stakeholder Panel for Managing Domestic Stocks of Commodity-Grade Mercury, July 24-25, 2007. Accessed August 13, 2015, at: https://archive.epa.gov/mercury/archive/web/pdf/byproductmercuryproductioninmodernpreciousmetalsminesinnevada.pdf

[285] Greg Jones and Glenn Miller "Mercury and Modern Gold Mining in Nevada," Final Report to EPA Region 9, October 24, 2005. Accessed January 13, 2015, at http://www.chem.unep.ch/mercury/Trade%20information/NRDC-NEVADABYPRODUCTRECOVERYREPORT.pdf.

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
	emissions can also volatilize from heaps and tailings facilities resulting in a discharge.[286]	
Land application disposal	Cyanide solution is sometimes applied to soil for disposal, in anticipation that exposure to air will neutralize the solution. Land application of spent cyanide solutions during operations, rinsing, and post-closure seepage treatment activities, however, may introduce cyanide into the environment that does not degrade and persists in the long-term.	In theory, cyanide may be attenuated in soils through treatment methods, including precipitation, biodegradation, and oxidation. Cyanide may persist long-term, though, despite these mechanisms.[289]

[287] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.1.

[288] "Nevada Voluntary Mercury Reduction Program (VMRP), Questions and Answers," Nevada Division of Environmental Protection, updated May 2005, accessed August 13, 2015, at https://ndep.nv.gov/mercury/docs/voluntar_mercury_q&a05.pdf.

[286] Glenn Miller, "Environmental Technologies in the Mining Industry," presented April 12, 2011. Accessed August 13, 2015, at: http://dels.nationalacademies.org/resources/static-assets/besr/miscellaneous/Miller.pdf

[289] Glenn Miller, "Environmental Technologies in the Mining Industry," presented April 12, 2011.

State and local governments implement solid waste management guidelines under RCRA Subtitle D. EPA's authority under Subtitle D is limited; its primary role is to promulgate sanitary landfill criteria to prevent adverse effects on health or the environment. As of 2013, EPA has not finalized any solid waste management requirements specifically applicable to the disposal of Bevill waste.

- **Discharges to Water:** Under the CWA ELGs for ore mining and dressing, mines and mills extracting and beneficiating gold and silver ores (except for placer deposits) must comply with a zero-discharge requirement for point sources of process wastewater." [290] These requirements also specify effluent limitations for other wastewater from gold mines and mills, including limits on cyanide, sediment, and other trace elements. Where ELGs may not apply, technology-based limits are developed during the facility-specific permitting process. The NPDES program applies to both active and inactive mines, as well as abandoned mines where legally responsible owners or operators of point sources can be identified. Runoff from tailings impoundments, spent ore piles and waste rock piles may be regulated under stormwater permits.[291] Stormwater permits regulate stormwater contaminated by contact with material from mining activities.
- **Surface Management:** BLM 3809 regulations on surface management have several requirements that relate to cyanide. Under BLM's 1990 cyanide management policy, cyanide operations on BLM lands must create a cyanide management plan and comply with design and treatment standards. Cyanide operations are also factored in BLM's bonding and reclamation requirements. BLM conducts quarterly inspections of operations using cyanide. Operators must construct and operate cyanide facilities such that they will not overflow during local 100-year or 24-hour storm events, snowmelt events, and draindown from heaps during power outages. Operators must also exclude access by the general public, wildlife, and livestock to structures containing lethal levels of cyanide. BLM regulations on the design, operation, and monitoring of waste management structures also apply to cyanide-bearing wastes.[292] The surface management regulations also specify engineering requirements and require liners, containment systems, and inspections for process areas, including cyanide leach operations and tailings impoundments or ponds.

  The USFS has not developed specific policies for cyanide management. Cyanide leaching operations are considered under the general review and permitting process, in which plans of operation and permitting incorporate operation-specific practices.

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[290] 40 CFR Volume 50 Subpart J Section 440. In light of recent Supreme Court cases regarding the scope of waters protected under the Clean Water Act, applicability is further clarified in the proposed rulemaking EPA and Army Corps of Engineers at 79 FR 22187, "Definition of 'Waters of the United States' Under the Clean Water Act," accessed at: https://www.federalregister.gov/articles/2014/04/21/2014-07142/definition-of-waters-of-the-united-states-under-the-clean-water-act

[291] The classification of point and nonpoint discharges from mining operations has evolved over time. For more information regarding current definitions of point sources from mining operations, see: *Greater Yellowstone Coalition v. Lewis*, 628 F.3d 1143 (9th Cir. Dec 23, 2010)

[292] 43 CFR Subpart 3809.420

- **Air Emissions:** No federal air regulations specifically oversee cyanide in mining operations. The CAA National Emission Standards for Hazardous Air Pollutants (NESHAPs), however, address mercury emissions from gold mine ore processing and production.[293] While mercury amalgamation is rarely used to extract gold from ore at currently operating mines, mercury can naturally occur in gold ore and can be released through thermal processing and refining.

State Regulations

Many states' regulatory requirements do not specifically address cyanide use in mining. In these cases, however, cyanide releases are controlled under other state environmental regulations. Many states have operational, technology, and performance-based standards for general mining waste management and disposal. For example, Nevada water pollution control regulations and California mining waste management regulations each have minimum design criteria and performance standards for the specific management of mining waste. Nevada's regulations apply to both waste rock piles and to disposal sites for processed ores. California's definition of mining waste (to which design and performance standards apply) includes all solid, semisolid, and liquid waste materials from the extraction, beneficiation, and processing of ores and minerals.

States also set surface and groundwater quality standards. Some of these, including Nevada, include limits on cyanide concentrations. Some states also have stormwater regulations directed at mining, which may regulate runoff from waste disposal units carrying cyanide-bearing wastes. In Alaska, stormwater discharges are required to have Alaska Pollutant Discharge Elimination System (APDES) permits, which require grab sampling for cyanide and effluent limitations consistent with the federal CWA. In Nevada, Nevada Stormwater General Permit NVR300000 applies specifically to stormwater discharges from waste rock dumps and overburden piles metals mining activities.

Some state regulations, which also often apply to operations on private land, specify requirements such as treatment criteria, engineering standards, as well as specific review processes for cyanide operations.[294] For example:[295]

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[293] 40 CFR 63, Subpart EEEEEEE *(area sources)*

[294] For survey reviews of state-level regulations, please see: California State Mining and Geology Board, *A Comparison of Regulatory Surface Mining Programs in the Western United States* (Sacramento: California Department of Conservation Resources Agency). Accessed August 13, 2015, at: http://www.consrv.ca.gov/smgb/reports/Documents/SMGB%20IR%202007-04%20FINAL%20with%20%20appendices.pdf; and U.S. Environmental Protection Agency, Office of Solid Waste. *Technical Report: Treatment of Cyanide Heap Leaches and Tailings* (Washington, DC: U.S. Government Printing Office, 1994). Accessed August 13, 2015, at: https://nepis.epa.gov/Exe/ZyNET.exe/2000EF6J.TXT?ZyActionD=ZyDocument&Client=EPA&Index=1991+Thru+1994&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C91thru94%5CTxt%5C00000012%5C2000EF6J.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=hpfr&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL.

[295] EPA selected states for review based on the level of overall hardrock mining and mineral processing activity. These states include: Alaska, Arizona, California, Idaho, Minnesota, Montana, Nevada, and Utah.

- **Nevada's** mining regulations specifically oversee cyanide.[296] Nevada water control regulations establish minimum design criteria for tailings impoundments and ponds. Process areas must obtain a permit to ensure compliance with these engineering standards. These rules also specify the treatment of spent ore from leaching operations. Nevada regulations prohibit mining facilities from causing the concentration of weak acid dissociable (WAD) cyanide in groundwater to exceed 0.2 mg/l. Spent ore left on pads or removed from pads must also demonstrate that WAD cyanide levels in effluent are under 0.2 mg/l. Cyanide in surface waters must not exceed a 22 µg/l average over one hour, and a 5.2 µg/l average over 96 hours.

Nevada's Voluntary Mercury Air Emission Reduction Program established mercury emission reduction goals.[297] Nevada also requires additional technological controls for mercury emissions on thermal units at existing and new metal mines. All users of thermal units at existing metal mines must apply for a Mercury Operating Permit to construct before constructing thermal units.[298]

- **Idaho** regulations require permits for cyanide facilities and lay out standards for construction, operation, and closure. Permit applications require environmental and risk management reviews.[299] Idaho regulations also require that before disposal or abandonment of leached ore, concentrations of WAD cyanide or free cyanide and other pollutants in process-contaminated water draining from the leached ore must be reduced to a level set by the permit writer based on disposal method, location, and potential for surface water and groundwater contamination, or have a pH of between 6.5 and 9 (stabilized).[300]

- **Indiana** water quality standards prohibit operations that produce cyanides and cyanogen compounds from draining these substances directly or indirectly into any sewer system or watercourse. Indiana regulations also require water treatment control facilities to submit monthly reports that detail flow measurements and wastewater characteristics to the Indiana Department of Environmental Management (IDEM).[301]

- Two states have enacted legal bans on the use of cyanide in mineral operations: a **Montana** referendum banned open pits that use cyanide leaching in 1998, and the **Wisconsin** legislature banned cyanide for mining and ore processing in 2001.

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[296] NAC 445A. Accessed at: http://www.leg.state.nv.us/nac/nac-445a.html.

[297] In 2003, Nevada produced 82 percent of the gold mined in the United States. The Toxic Release Inventory (TRI) for Nevada indicates that four Nevada mining companies emitted roughly 90 percent of the state's reported mercury air emissions in 2001. For more information, see: "Fact Sheet: Final Rule to Reduce Mercury Emissions from Gold Mine Ore Processing and Production Sources," U.S. Environmental Protection Agency, updated 2010. Accessed February 13, 2015, at http://www.epa.gov/ttn/atw/area/gold_mines_fs_121610.pdf

[298] NAC 445B.3611 – 445B.3689. Accessed at: http://www.leg.state.nv.us/nac/nac-445b.html.

[299] IDAPA 58.01.13. Accessed at: https://adminrules.idaho.gov/rules/2005/58/0101.pdf.

[300] IDAPA 58.91.13. Accessed at: http://adminrules.idaho.gov/rules/2005/58/0101.pdf.

[301] 327 IAC 2. Water Quality Standards. Accessed at: http://www.in.gov/legislative/iac/title327.html.

Non-Operating Sites and Currently Operating Facilities

The available documents showed that cyanide leach processes were used in at least seven of 15 non-operating sites in the sample, and are used in at least five of 16 currently operating facilities in the sample. Additionally, 2013 TRI data indicated that throughout the United States, at least 23 mineral mining facilities handled cyanide compounds.

The combined history of these sites and facilities suggests that releases can occur during operations, as well as post-closure from waste storage facilities. In addition, financial health of companies can influence operational and mitigation practices employed by the operators, which, in turn, may affect the potential for releases.

Non-Operating Sites

Fifteen non-operating CERCLA sites that mined or processed gold or silver were reviewed.[302] These non-operating sites showed contamination from hazardous substances such as trace elements, cyanide, and polychlorinated biphenyls (PCBs); they also discharged MIW. Cyanide was used at seven of the 15 non-operating sites.

Eleven of 15 sites began operations before 1900. It is possible that these sites became contaminated before the promulgation of major environmental laws and regulations that currently govern mining and primary processing. For example, little mineral extraction or processing activity took place at one of the sites in the sample, the Upper Tenmile Creek Mining Area, after the 1930s. Similarly, California Gulch (EPA ID COD980717938) ceased operations before 1980. ROD and RI/FS documents do not, however, discuss regulatory oversight at the time releases occurred.

At the same time, research shows that since the promulgation of major environmental laws since 1980, gold mines and mineral processing sites using cyanide leach methods have continued to experience releases resulting in CERCLA site listing. In particular, heap leach processes have been associated with five of the six cyanidation-related releases since 1980, while one site experienced leaks from a tank leaching operation. For example, the Brewer Gold Mine used heap leach cyanidation methods to process ore. In 1990, large rainstorms caused a dam to break and over 10 million gallons of the solution spilled into the nearby waterways. The leaked solution killed fish in Little Fork Creek and Lynches River for nearly 50 miles downstream.

The review of these 15 non-operating sites also showed that financial and economic factors appear to have played a role in some of the actions leading up to these CERCLA listings. For example:

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[302] The sample includes: Asarco, Inc. (Globe Plant) (EPA ID COD007063530), Barite Hill/Nevada Goldfields (EPA ID SCN000407714), Blackbird Mine (EPA ID IDD980725832), Brewer Gold Mine (EPA ID SCD987577913), Bueno Mill & Mine Site (EPA ID CON000802129), Bunker Hill Mining & Metallurgical Complex (EPA ID IDD048340921), California Gulch (EPA ID COD980717938), Captain Jack Mill (EPA ID COD981551427), Cimarron Mining Corp. (EPA ID NMD980749378), East Helena Site (EPA ID MTD006230346), Gilt Edge Mine (EPA ID SDD987673985), Pioneer Pit and Gardner's Point Placer Mines (EPA ID CAN000905978), Silver Mountain Mine (EPA ID WAD980722789), Summitville Mine (EPA ID COD983778432), and Upper Tenmile Creek Mining Area (EPA ID MTSFN7578012).

- The Gilt Edge Mine's operations began at the site in 1876, although cyanidation was not used throughout the entire duration of operation. Currently, the 360-acre primary mine disturbance area encompasses a former open pit and a cyanide heap-leach gold mine, as well as prior mine exploration areas used by various companies. The Brohm Mining Company, the most recent mine operator, faced financial problems in the 1990s and informed state authorities that it would not continue site controls. The Brohm Mining Company left 150 million gallons of acidic metal-laden water in three open pits, as well as millions of cubic yards of acid-generating waste rock that requires cleanup and long-term treatment. Elevated nitrates and cyanide were present in heap leach residues. Consequently, EPA proposed a CERCLA listing on May 11, 2000.
- At the Summitville site, Summitville Consolidated Mining Corp., Inc. used cyanide heap leaching to extract precious metals. In 1986, a leak was detected in the heap leach pad. Summitville Consolidated abandoned the site and filed for bankruptcy in December 1992. EPA assumed responsibility of the site as an emergency response and placed the site on the NPL two years later.
- Other non-operating, non-Superfund sites also offer examples of cyanide leaching releases. Zortman and Landusky Mines (MSHA ID 240150) and Beal Mountain Mine (MSHA ID 2401642), all in Montana, used cyanidation to extract precious metals. Both underwent bankruptcy and left significant pollution at their respective sites. In addition to a heap leach pad leak, the Zortman and Landusky facility experienced cyanide releases from a leach pad pipe, a solution pond liner leak, and a process pond liner leak.[303]

Currently Operating Facilities

All 16 currently operating facilities selected for closer analysis have been in operation for fewer than 40 years.[304] Of these, 11 began activities under their current operator after 2000. Equipment failure or operator errors were cited as reasons for almost all documented releases at facilities in the currently operating sample. ERNS and enforcement information revealed evidence of releases of cyanide at three facilities. Our review revealed evidence of 13 cyanide releases from four sites, from 1991-2014. Six of these releases occurred in 2000 or later. Three incident reports in ERNS for the sample of currently operating facilities report spills of cyanide of 22,000

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303 U.S. Bureau of Land Management, *Final Engineering Evaluation/Cost Analysis (EE/CA) For Water Management at the Zortman and Landusky Mines, Phillips County Montana*, prepared by Spectrum Engineering (Washington, DC: U.S. Government Printing Office, 2006). Accessed August 28, 2015: http://www.blm.gov/style/medialib/blm/mt/field_offices/lewistown/zortman.Par.62509.File.dat/finaleeac.pdf; and US Department of Agriculture. *Final (Revision 6) Engineering Evaluation/Cost Analysis. Beal Mountain Mine. Beaverhead-Deerlodge National Forest Silver Bow County, Montana*, prepared by Tetra Tech (Washington, DC: U.S. Government Printing Office, 2010). Accessed August 28, 2015, at: http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5183264.pdf.

304 These include: Apache Mining Old Wasp Mine(MSHA ID: 0203246), Barrick Cortez (MSHA IDs 2600827 and 2602573), Barrick Goldstrike Mine/Mill/Roaster (MSHA IDs 2601089, 2602674, and 2602673), Golden Sunlight Mine (MSHA ID 2401417), Coeur Kensington (MSHA ID 5001544), Coeur Rochester (MSHA ID 2601941), Florida Canyon Mine (MSHA ID 2601947), Geo Nevada Spring Valley (MSHA ID 2602470), Hecla Greens Creek (MSHA ID 5001267), Kinross Crown Resources Buckhorn Mine (MSHA ID 4503615), Newmont Chukar (MSHA ID 2602481), Newmont Emigrant/Mill 6 (MSHA IDs 2602697 and 2602678), Sixteen To One Mine (MSHA ID 0401299), US Silver Galena (MSHA ID 1000082), Veris Gold Saval 4- Jerritt Canyon (MSHA IDs 2602742 and 2601621), and Waterton Global Hollister Mine (MSHA ID 2602535).

gallons, 53,000 gallons, and 159,000 gallons in single incidents, respectively. Permit documents for one currently operating facility also reported an estimated leak of 170,000 gallons of tailings seepage solution from a ruptured underground pipe. Currently operating facilities that experienced releases from cyanidation operations include:

- ERNS data showed reports of 31 releases from 1990-2013 at Barrick Goldstrike Mine (EPA ID NVD000626531), a gold surface mine, including releases of arsenic, mercury, cyanide, and sulfuric acid. Several of these releases involved relatively large quantities, such as a spill of 21,625 gallons of sodium cyanide in 1995 due to equipment failure of a process unit and a spill of 159,000 gallons of cyanide in 2003 due to equipment failure from a tailings impoundment, which affected a nearby dry stream bed. In 2015, Barrick paid penalties for RCRA Subtitle C allegations regarding mercury releases dating back to 2007.[305] The mine has also faced administrative enforcement actions under the Clean Air Act and CERCLA for a release of 3,300 pounds of anhydrous ammonia in 2011, which resulted in the evacuation and transport to local hospitals of 13 workers.[306]
- The **Florida Canyon** mine (MSHA ID 2601947) began operations in Nevada In 1986 as a cyanide heap leach facility. The west side of the mine's leach pad seeped cyanide, mercury, nitrate, and process solution into the groundwater. Remediation began in 2000, but the contamination continued. As a result, the Nevada Department of Environmental Protection issued a Finding of Alleged Violation and Order in August 2012, and BLM placed the mine in noncompliance at the same time. The facility submitted a corrective action plan in 2013, involving a groundwater plume pump back system and capture zone evaluation.[307]

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[305] "Enforcement and Compliance History Online (ECHO): Barrick Goldstrike Mines, Inc. (FRS ID 11003802178)," U.S. Environmental Protection Agency. Accessed September 28, 2016, at: https://echo.epa.gov/enforcement-case-report?id=09-2012-5124.

[306] "Enforcement and Compliance History Online (ECHO): Barrick Goldstrike Mines, Inc. (FRS ID 11003802178)," U.S. Environmental Protection Agency. Accessed September 28, 2016, at: https://echo.epa.gov/enforcement-case-report?id=09-2014-3501.

[307] Office of Resource Conservation and Recover. "Discharges from Hardrock Mines and Mineral Processors Operating in the Modern Mining Era (1978-Present)." September 29, 2016.

F. Acid Leach, Solvent Extraction and Electrowinning

Introduction

Acid leaching (including heap leaching and dump leaching techniques) usually entails treating crushed or uncrushed (run-of-mine) ore with sulfuric acid solution to dissolve the metal, which is then recovered and purified by solvent extraction and electrowinning (SX/EW). Hydrometallurgical processes, including acid leaching, are most commonly applied to oxide ores and low-grade oxide and sulfide mine wastes.[308] Although it is occasionally used for other metals such as nickel and mercury, acid leaching is generally identified with the production of copper, which is by far its most common use.[309] As such, this chapter focuses on acid leach in relation to copper production. Heap and vat leaching processes using cyanide solutions to produce precious metals such as gold and silver are described in Section 1.E.

Leaching tanks, leach pads, piping and storage facilities (e.g., process solution ponds and facilities associated with leaching) can release sulfuric acid and mobilized contaminants into the environment. These leaching solutions can pose significant environmental and human health risks if they are not contained successfully. Information on documented releases reveals that acid leach operations have caused contamination of both surface and groundwaters in addition to injuring habitat and wildlife. Releases due to equipment failures, chronic seepage, or weather-related overflows seem to be the most common problems; acid leach operations need to ensure proper reclamation of spent dump or heap leach piles, maintenance of equipment, and preparation of systems for severe weather in order to minimize environmental impacts.

Past and Current use

Dump leaching involves the application of leach solution to uncrushed and otherwise unprocessed ore, directly from the mine. Because of its low cost, dump leaching is the most common leach method used for production of copper. Dump leaching is also used for nickel mining. Because the dump leaching process can take up to two years to process a given ore pile and in some cases results in relatively low extraction rates, heap leaching may be employed instead. In heap leaching, the operator first crushes or agglomerates the ore, exposing more surface area and making the leach solution more effective. Although also typically used for treatment of low-grade ores, heap leaching is slightly more expensive. Because of this cost

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[308] U.S. Congress, Office of Technology Assessment, "Chapter 6: Copper Production Technology," in *Copper: Technology and Competitiveness* (Washington, DC: U.S. Government Printing Office, 1988).

[309] Randolph Scheffel, "Copper Heap Leach Design and Practice," in *Mineral Processing Plant Design, Practice, and Control Proceedings*, ed. Andrew L. Mular (Englewood, CO: Society for Mining, Metallurgy, and Exploration, 2002).

differential, the prevalence of heap leaching increases during periods of high commodity prices.[310]

In 1963, General Mills' production of LIX 63 (a copper reagent) led to the widespread use of the SX/EW process for copper production. The SX/EW process has also been extended to the production of nickel, cobalt, and rare-earth elements in some instances, but copper production remains by far the most common use.[311] As of 2013, 38 percent of total U.S. mine production of copper was processed using leaching and SX/EW.[312]

Technical Description

Leaching

Leaching dissolves metals from ore using aqueous or other liquid medium. Two main types of acid leaching systems process ore in contemporary copper mining operations: dump leaching and heap leaching. Raffinate (sulfuric acid solution) is the most common process solution employed during acid leach.

Heap leaching (described in greater detail in Section 1.E.) involves placing ore on a leach pad on an impermeable barrier and applying solution to the ore stack (usually through sprinklers or drip irrigation). Dump leaching is very similar to heap leaching, except ore is not crushed before being placed on the leach pad, and in most cases the leach pad is not lined. Instead, downstream surface and groundwater collections systems are typically employed to capture the leach solution. After leaching, the pregnant solution containing the dissolved metals is piped to the SX/EW plant, and the spent leach solutions are generally recycled for reuse.

SX/EW

In a typical solvent extraction circuit, the pregnant solution from leaching is pumped to a mixer, where the aqueous solution is mixed with an extractant (usually an organic solvent) to form a concentrated metal-laden solution. The extractant is designed to extract only the desired metal (e.g., copper), leaving impurities (such as unwanted metals) in the leachate. The solution is then pumped to a settling tank, where the copper-loaded organic solution is separated from the aqueous leachate solution. The leachate (now devoid of the desired metal) is recycled back to the leaching unit, and the copper-laden solution moves to the electrowinning stage.

In electrowinning, an electric current is passed through the metal-laden solution within an electrolytic cell, which causes the dissolved metals to deposit on cathodes. These purified metal

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[310] John Marsden, and Iain House, *The Chemistry of Gold Extraction*, Second Edition (Englewood, CO: Society for Mining, Metallurgy and Exploration, 2006).

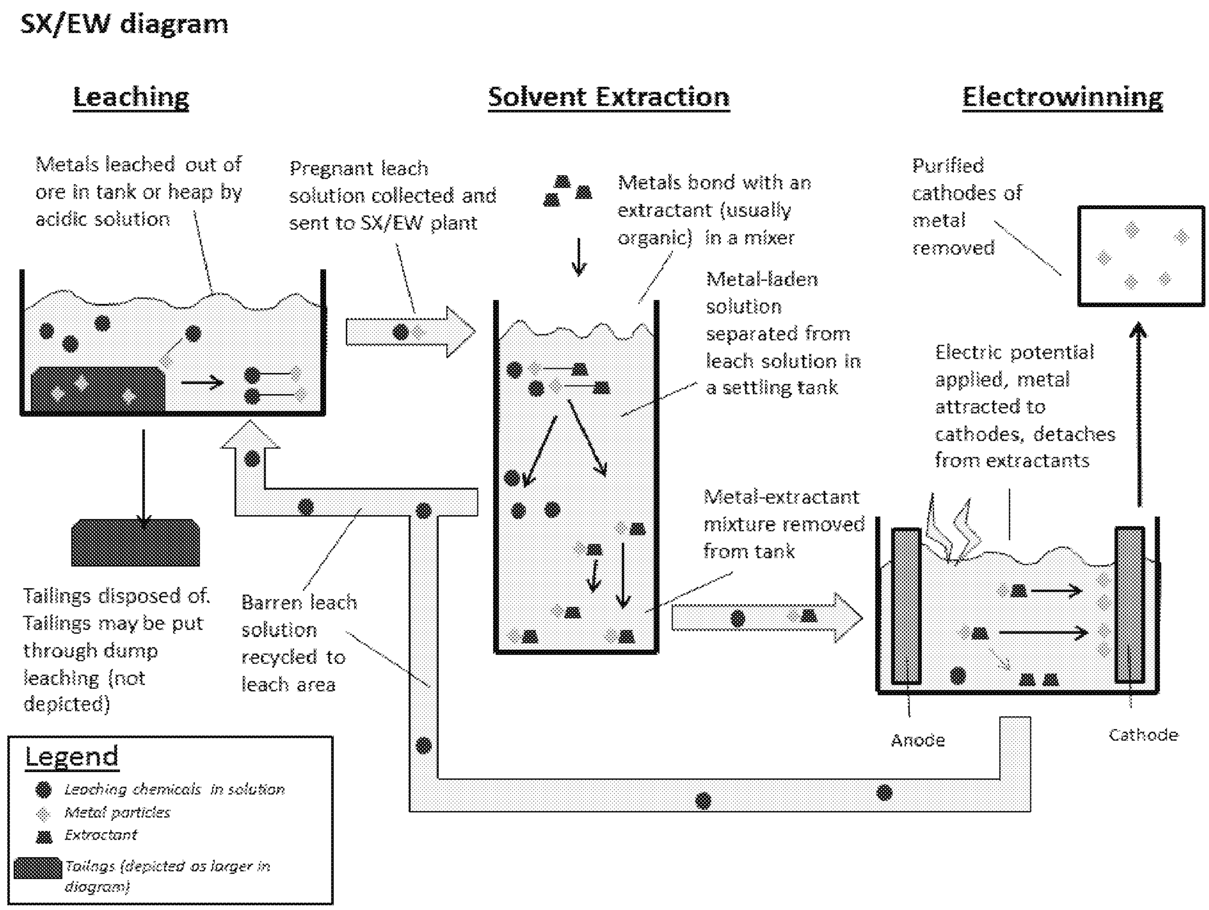
[311] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[312] "USGS Minerals Yearbook: Copper," U.S. Geological Survey, 2013. Accessed Dec. 18, 2015, at http://minerals.usgs.gov/minerals/pubs/commodity/copper/myb1-2013-coppe.pdf.

deposits are ready to be removed, and the remaining solution can be recycled back to the extraction stage.[313]

Exhibit 1.F.1. shows a simplified flow chart of the acid leach, solvent extraction, and electrowinning process.

Exhibit 1.F.1. Acid Leach, Solvent Extraction and Electrowinning Flow Chart



Potential Sources of Hazardous Substances

Sulfuric acid is the most common leaching agent used for acid leach and SX/EW. The process also uses large quantities of organic solvents that can require costly disposal. These process reagents can have serious human health consequences as well as ecological effects.[314] In addition, sulfuric acid can leach metals from other mining wastes and containment areas,

[313] U.S. Congress, Office of Technology Assessment, "Chapter 6: Copper Production Technology," in *Copper: Technology and Competitiveness* (Washington, DC: U.S. Government Printing Office, 1988).

[314] Agency for Toxic Substances and Disease Registry: Division of Toxicology, *Public Health Statement Sulfur Trioxide and Sulfuric Acid* CAS#: 7664-93-9 (Washington, DC: U.S. Government Printing Office, 1998). Accessed December 18, 2015, at http://www.atsdr.cdc.gov/ToxProfiles/tp117-c1-b.pdf.

transporting other contaminants to surface and groundwater systems. While leaching solutions are generally recycled back to the process, failure to contain them properly can result in releases. After leaching has been discontinued, the abandoned leach site can be a source of acidic effluents, hazardous trace elements, and total dissolved solids if it is not properly monitored and managed.[315] MIW and runoff originating from exposed heap leach piles or tailings are also distinct risks associated with this practice.[316] Exhibit 1.F.2 discusses these types of potential releases in more detail.

State and Federal Regulations

Current operations are subject to substantially more comprehensive regulatory requirements relative to past operations, where discharges and abandonment were common. At both the federal and state level, land management and environmental regulations address potential environmental risks from copper mining and primary processing, including the practices and potential release risks identified above.

Mining and processing operations may be subject to preliminary environmental planning and assessment, operational requirements and performance standards, and reclamation requirements.

Federal Regulations

Federal agencies have promulgated rules regarding acid leaching operations under mining regulations. These include:

- **Solid waste.** RCRA Section 3001(b)(1) (the Bevill Amendment) exempts solid waste from extraction and beneficiation, including leaching, solvent extraction, and electrowinning, from regulation as hazardous waste under RCRA Subtitle C. State and local governments implement solid waste management guidelines under RCRA Subtitle D. EPA's authority under Subtitle D is limited; its primary role is to promulgate sanitary landfill criteria to prevent adverse effects on health or the environment. As of 2013, EPA has not finalized any solid waste management requirements specifically applicable to the disposal of Bevill waste.[317]

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[315] U.S. Congress, Office of Technology Assessment, "Chapter 8, Environmental Aspects of Copper Production," in *Copper: Technology and Competitiveness* (Washington, DC: U.S. Government Printing Office, 1988).

[316] Mine runoff can result from a number of mining and processing features, including exposed rock tunnels and waste rock tunnels. This issue is not unique to cyanidation practices. Although this process occurs naturally, mining exposes increased quantities of waste rock and tailings to rainwater, snowmelt, and surface water. Acidic drainage reduces the pH levels of surrounding aquatic ecosystems, threatening aquatic life and vegetation, and drainage of any pH level can contain mobilized contaminants.

[317] L. Luther, "Background on and Implementation of the Bevill Bentsen Exclusions in the Resource Conservation and Recovery Act: EPA Authorities to Regulate 'Special Wastes,'" *Congressional Research Service* R43149 (Washington, DC: U.S. Government Printing Office, 2013).

Exhibit 1.F.2. Potential Releases Associated with Acid Leach and SX/EX

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
Solution from tanks or leach piles	Process chemicals such as sulfuric acid that are used in acid leach and SX/EW may be discharged from drums, tanks and other storage containers during operations and post-closure if not properly disposed. Leaks may also occur from the leaching system itself, such as from heap leach pad liner punctures. Valley-fill heap leach designs create a high risk of solution leakage and storage issues because of the high fluid pressures.[318] Discharges of leach solutions may occur as a result of leakage of ponds, tanks, and piping during operations and may also be responsible for long-term post-closure seepage containing acidic effluents and toxic metals.[319,320]	Liner systems can be designed and constructed with leak detection alarm systems and fluid recovery systems. Typically, a minimum of one synthetic membrane is used in combination with a compacted earthen liner. Additional measures, such as using two synthetic liners, can be applied when significant pressure creates cause for concern. Leak collection systems can be constructed between primary and secondary synthetic liners to collect and remove fluids from leaks, minimizing the pressure on the secondary liner. Fluid collection pipes can transmit fluid away from drainage layers. Detailed hydrologic characterization of heap and dump sites before construction and ongoing monitoring are additional proactive management steps that mitigate the possibility of a harmful release.
Leach tailings	Following acid leach operations, the spent ore or tailings is discharged to a tailings storage facility (impoundment). These wastes may be highly acidic and may also contain metals present in the ore body.[321] The waste impoundment may be	During mine design, targeted extraction techniques such as selective mining and avoidance could be used to minimize mining of ore resulting in leach tailings that could result in MIW.[322]

[318] Daniel Kappes, "Precious Metal Heap Leach Design and Practice," in *Mineral Processing Plant Design, Practice, and Control Proceedings*, ed. Andrew L. Mular (Englewood, CO: Society for Mining, Metallurgy, and Exploration, 2002).

[319] Daniel Kappes, "Precious Metal Heap Leach Design and Practice," in *Mineral Processing Plant Design, Practice, and Control Proceedings*, ed. Andrew L. Mular (Englewood, CO: Society for Mining, Metallurgy, and Exploration, 2002).

[320] U.S. Congress, Office of Technology Assessment, "Chapter 8, Environmental Aspects of Copper Production," in *Copper: Technology and Competitiveness* (Washington, DC: U.S. Government Printing Office, 1988).

[321] Bernd Lottermoser, *Mine Wastes: Characterization, Treatment and Environmental Impacts*, 3rd Edition (Medford, MA: Springer Science and Business Media, 2010).

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
	unlined or lined, and in either case might incorporate a collection or pumpback system for recovery of escaped tailings solution.	As part of the leach tailings disposal facility design, engineered barriers such as a liner can be utilized to collect seepage from tailings resulting in reduced seepage management requirements.[323] Another technique is production of paste or dry dewatered leach tailings to reduce potential for MIW.[324] During operations special handling techniques such as the addition of alkaline materials or amendments can be used to reduce potential for AMD from leach tailings.[325] At closure leach tailings areas can be reclaimed using dry and wet covers to lessen or minimize discharges of MIW.[326]
Mine drainage	Water percolating through uncovered or otherwise exposed tailings or leach piles may react with sulfide compounds, creating acid drainage. Depending on the hydrology of the site, the acid drainage may be discharged to groundwater or surface water. A variety of factors affect the rate of acid drainage generation from tailings, including the water level within the pile, exposure to oxygen, and the presence of bacteria. Tailings and ore piles are susceptible to acid generation because of the	In the event the mine drainage requires treatment prior to discharge, either during operations or post-closure, a variety of active, passive and in situ mine drainage treatment techniques are potentially applicable.[328]

[322] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.1.

[323] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.6.1.

[324] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.8.

[325] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.4.2.

[326] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.3.2.

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
	increased surface area exposure of minerals not extracted by the leaching process. Both surface water discharges and seepage from tailings impoundments may contain acid drainage which also increases the leaching and mobility of metals.[327]	

[328] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 7.5.

[327] U.S. Environmental Protection Agency, Office of Solid Waste, Special Waste Branch, *Technical Resource Document: Extraction and Beneficiation of Ores and Minerals* EPA 530-r-94-013, Volume 2: Gold (Washington, DC: U.S. Government Printing Office, 1994).

Facilities sometimes dispose of Bevill-exempt wastes in the same waste management units as non-exempt hazardous wastes.[329] In situations where facilities combine tailings with other wastes that exhibit hazardous characteristics, the waste mixtures may fall under RCRA Subtitle C regulations.

- **Discharges to Water:** Untreated tailings may not be discharged into surface waters.[330] To comply with water quality standards under the CWA, mine operators must obtain permits under NPDES for any discharge of pollutant from a point source to waters of the United States.[331] For many hardrock commodities, EPA has promulgated ELGs requiring technology-based controls and establishing specific water quality standards. For example, the ore mining and dressing ELG establishes a zero-discharge requirement for point sources of process wastewater for copper mining and milling operations using leaching processes, and the nonferrous metals manufacturing ELG establishes water quality requirements for discharges from electrowinning operations.[332] For discharges or pollutants not covered by the ELGs, EPA or the delegated state authority incorporates limits into permits on a site-specific basis. Under the CWA ELGs for ore mining and dressing, mines and mills extracting and beneficiating copper ores using leaching processes must comply with a zero-discharge requirement for point sources of process wastewater."[333] Where ELGs may not apply, technology-based limits are developed during the facility-specific permitting process. The NPDES program applies to both active and inactive mines, as well as abandoned mines where legally responsible owners or operators of point sources can be identified.

  Runoff from tailings impoundments, spent ore piles, and waste rock piles may be regulated under NPDES stormwater permits if it is not commingled with process water or

[329] An EPA survey of 106 facilities in 1989 indicated that 20 facilities placed mixtures of Bevill-exempt and non-exempt wastes in the same waste management unit. See: U.S. Environmental Protection Agency, *Mineral Processing Facilities Placing Mixtures of Exempt and Non-Exempt Wastes in On-site Waste Management Units: Technical Background Document Supporting the Supplemental Proposed Rule Applying Phase IV Land Disposal Restrictions to Newly Identified Mineral Processing Wastes* (Washington, DC: U.S. Government Printing Office, 2013).

[330] U.S. Environmental Protection Agency Region 10, *EPA and Hardrock Mining: A Source Book for Industry in the Northwest and Alaska* (Washington, DC: U.S. Government Publishing Office, 2003).

[331] Point sources are defined broadly, includes any discernable, confined, and discrete conveyance, such as a pipe, ditch, channel, tunnel, conduit, or container. "Waters of the United States" includes navigable waters, tributaries, interstate waters, intrastate waters used by interstate travelers, or for industrial purposes by industries engaged in interstate commerce. Generally, mining operations would fall under the Clean Water Act for process wastewater, mine drainage, and stormwater. See: U.S. Environmental Protection Agency Region 10, *EPA and Hardrock Mining: A Source Book for Industry in the Northwest and Alaska* (Washington, DC: U.S. Government Publishing Office, 2003).

[332] 40 CFR 440 (ore mining and dressing); 40 CFR Part 421 (nonferrous metals manufacturing).

[333] 40 CFR Volume 50 Subpart J Section 440. In light of recent Supreme Court cases regarding the scope of waters protected under the Clean Water Act, applicability is further clarified in the proposed rulemaking EPA and Army Corps of Engineers, "Definition of 'Waters of the United States' Under the Clean Water Act," 79 *FR* 22187 (Washington, DC: U.S. Government Printing Office, 2014). Accessed December 18, 2015, at: https://www.federalregister.gov/articles/2014/04/21/2014-07142/definition-of-waters-of-the-united-states-under-the-clean-water-act

mine drainage.[334] Stormwater permits regulate stormwater contaminated by contact with material from mining activities, primarily requiring site-specific pollution prevention planning and/or implementation of mitigation practices.[335] These include treatment requirements, operating procedures, practices to control runoff, and monitoring.

- **Surface Management:** Mining operations on public federal land are subject to additional regulation. According to the BLM Section 3809 rules, mining operations must prevent unnecessary or undue degradation, which includes managing all tailings, rock dumps, deleterious material or substances and any other waste produced from mining operations.[336] Any field-scale testing using sulfuric acid (e.g., test heaps) must be conducted under a formal plan of operations, which includes environmental evaluation. BLM guidance indicates that proper disposal of mining wastes must involve siting of tailings facilities to minimize potential for environmental impact. Further, operators must conduct reclamation to maximize long-term geotechnical and geochemical stability and minimize the formation and release of leachate.[337] Requirements include:
    - Operators must have low-permeability liners or containment systems to minimize the release of solution to the environment using best available technology, and must monitor for potential contaminant releases from leaching operations and tailings impoundments.
    - Operators must construct a secondary containment system around vats, tanks, and recovery circuits that can retain solution from a leak or failure, in order to prevent the release of toxic solutions to the environment.
    - Operators must design, construct, and operate leaching facilities and tailings impoundments to contain precipitation from the local 100-year, 24-hour storm event.
- **Air Emissions:** Leaching and the SX/EW process do not produce the air pollution associated with alternative processes, such as smelting. No regulations under the CAA or other laws directly apply to acid leaching, solvent extraction, and electrowinning.

State Regulations

Many states have operational, technology, and performance-based standards for general mining waste management and disposal in state solid waste regulations, state groundwater pollution laws, dam safety programs, or state mining laws. Generally, state and local governments

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[334] Seepage to groundwater is not considered a point source, and is not regulated under the Clean Water Act. The classification of point and nonpoint discharges from mining operations has evolved over time. For more information regarding current definitions of point sources from mining operations, see: *Greater Yellowstone Coalition v. Lewis*, 628 F.3d 1143 (9th Cir. Dec 23, 2010)

[335] Best management practices for stormwater permits are described at 40 CFR 122.2.

[336] 43 CFR Part 3809

[337] U.S. Department of the Interior, Bureau of Land Management, *Surface Management Handbook* H-3809-1 (Washington, DC: U.S. Government Printing Office, 2012), Section 5.3.2

implement solid waste management guidelines under RCRA Subtitle D, establishing operating and closure requirements that apply to all types of industrial waste disposal units. States with delegated authority also implement CWA regulations, with state programs at least as stringent as federal regulations. Several state regulations specifically manage mine tailings, although in some cases tailings with no chemical additives are excluded from regulation. For example:

- **Alaska's** land reclamation performance standards require heap leach operations to neutralize spent ore (AS 27.19.020; 11 AAC 97.200-240).
- **Arizona's** APP program requires leaching operations and tailings facilities to use best demonstrated control technology and to comply with Aquifer Water Quality Standards.
- **Idaho's** Rules for Ore Processing require pollutant levels in water draining from leached ore to be reduced to a level established in a permit, and to have a pH of between 6.5 and 9 (IDAPA 58.91.13).

Additional examples of specific state programs for tailings management are discussed in Section 2.C.

Non-Operating Sites and Currently Operating Facilities

The available documents identified acid leach and/or SX/EW processes as a practice for at least two of 29 non-operating sites in the sample,[338] and at least 9 of 70 currently operating facilities in the sample.[339] Copper was the most common commodity produced at these sites.

The combined history of these sites and facilities suggests that releases associated with acid leach and SX/EW processes can occur during operations, as well as during the post-closure period from waste storage facilities.

Non-Operating Sites

Out of the two non-operating sites in the sample that identified acid leach and SX/EW as a process, one site presented evidence of related contamination:

- The **Cyprus Tohono** (EPA ID AZD094524097) mine is located near Casa Grande, Arizona. Between 1975 and 1983, this site leached oxide ore using sulfuric acid solution (raffinate) and then used SX/EW to produce copper cathodes. The leach tailings were excavated and hauled to nearby storage areas. Soil in the storage areas was later found to

  have elevated levels of selenium, sulfate, and other trace elements and nearby

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[338] Cyprus Tohono Mine (EPA ID AZD094524097) and ASARCO, Inc. Globe Plant (EPA ID COD007063530).

[339] ASARCO Ray Hayden (MSHA ID 0200150), ASARCO Silver Bell (MSHA ID 0200134), Freeport McMoran Tyrone (MSHA ID 2900159), Rio Tinto Kennecott Magna/Kennecott North (MSHA ID 4200149), Rio Tinto Kennecott Copperton/Kennecott South (MSHA ID 4201996), Freeport McMoran Morenci (MSHA ID 200024), Energy Fuels White Mesa Mill (MSHA ID 4201429), Materion Delta (MSHA ID 4200706), Molycorp Mountain Pass (MSHA ID 402542).

groundwater had high concentrations of sulfate and uranium.[340] Although copper operations continue at this mine, CERCLA removal actions have addressed contamination from former tailings impoundments and process ponds.

Research into additional sites revealed further evidence of releases due to leaching activity. For example, the Torch Lake Copper Mines (MID980901946), located in Keweenaw Peninsula in Michigan, discharged stampsands the operator had leached for copper between 1868 and 1968 that reduced Torch Lake's volume by 20 percent and dramatically altered the shoreline. In addition, lesions and tumors were found on fish caught in the lake. In 1972, the operator discharged 27,000 gallons of leaching liquor into the lake.[341]

Currently Operating Facilities

Out of the nine current sites in the reviewed sample that identified acid leach and SX/EW as a process, evidence of related contamination was present at five sites;

- The **ASARCO[342] Ray Hayden** (MSHA ID 0200150) mine is located near Hayden, Arizona. ASARCO Ray Hayden operations include leaching facilities, an open-pit copper mine, milling operations, a solvent extraction plant, and an electrowinning plant. The facility is conducting cleanup under a 2008 CERCLA administrative consent order (EPA ID AZD008397127), for contamination potentially dating back to the beginning of operations in 1911. Several recent releases occurred at the site, most of them due to the failure of the leachate collection systems during heavy rain. During 1990-1993, at least 19 spills of hazardous materials were reported, typically either chronic seepage from leaching facilities or accidental discharges from dams, pipelines and ponds. For example:
    - In 1990, a rainstorm overwhelmed several dams and the screens leading to the solution collection pipelines became clogged with debris. As a result, copper-laden leachate solutions overflowed the dams, releasing approximately 324,000 gallons to Mineral Creek.[343]
    - In 1991, a broken pipeline caused 150,000 gallons of leach solution to discharge to Mineral Creek. Later that year, an electrical failure led to another release of 1,500 gallons of solution.[344]

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[340] U.S. Army Corps of Engineers, *Preliminary Assessment/Site Inspection Report: Cyprus Tohono Mine, Casa Grande AZ* USACE Contract No.: DACA45.98.D0004 Task Order 25 (Washington, DC: U.S. Government Printing Office, 2003).

[341] U.S. Environmental Protection Agency Region V, *Record of Decision: Decision Summary, Torch Lake Superfund Site Operable Unit II, Houghton County, Michigan* (Washington, DC: U.S. Government Printing Office, 1993).

[342] Prior to its 2005 Chapter 11 Bankruptcy, "ASARCO" was the abbreviation for the American Smelting and Refining Company. After reorganization, the emerging company's name was ASARCO, LLC.

[343] U.S. Environmental Protection Agency, *Damage Cases and Environmental Releases from Mines and Mineral Processing Sites* (Washington, DC: U.S. Government Printing Office, 1997).

[344] U.S. Environmental Protection Agency, *Damage Cases and Environmental Releases from Mines and Mineral Processing Sites* (Washington, DC: U.S. Government Printing Office, 1997).

   - In 1993, a bulldozer struck a leachate solution pipeline resulting in the release of 7,200 gallons of copper sulfate solution to Mineral Creek.[345]

  These releases resulted in water quality degradation at the site and visible impacts on Mineral Creek – the cobble and gravel substrate in the nearby streambed was coated with a blue-green layer of copper oxides.[346]

- The **ASARCO Silver Bell** (MSHA ID 0200134) mine is located near Marana, Arizona. Leaching operations at Silver Bell occurred between 1960 and 1993. During site inspections conducted in 1993, the Arizona Department of Environmental Quality (ADEQ) observed a stream originating at the base of an active leach dump near El Tiro Pit. Samples revealed multiple water quality violations from this leach dump, including contamination from selenium, zinc, cadmium, and copper, which resulted in surface water quality degradation.[347]

- The **Freeport McMoran Tyrone** (MSHA ID 2900159) mine is located near Silver City, New Mexico. The Tyrone mine is a porphyry copper deposit that uses leaching and an SX/EW plant to produce copper. Several documented spills occurred at the site, mostly due to pipeline failures or seepage. For example:
   - In 1997, 65,000 gallons of raffinate leaked from a ruptured weld.[348]
   - In 2003, maintenance activity on a pipeline system led to 2,600 gallons of raffinate spilling.[349]

  At least five other related spills were reported between 1994 and 2012. These releases have resulted in contaminated groundwater and surface water throughout the mine's area, and a 2012 groundwater assessment concluded that groundwater seepage from the Tyrone Mine will require water treatment in perpetuity.[350]

- The **Rio Tinto Kennecott Copperton/ Kennecott South** (MSHA IDs 4200149 and 4201996) mine is located southwest of Salt Lake City, Utah. The Kennecott Copper Mine

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345 U.S. Environmental Protection Agency, *Damage Cases and Environmental Releases from Mines and Mineral Processing Sites* (Washington, DC: U.S. Government Printing Office, 1997).

346 U.S. Environmental Protection Agency, *Damage Cases and Environmental Releases from Mines and Mineral Processing Sites* (Washington, DC: U.S. Government Printing Office, 1997).

347 U.S. Environmental Protection Agency, *Damage Cases and Environmental Releases from Mines and Mineral Processing Sites* (Washington, DC: U.S. Government Printing Office, 1997).

348 Bonnie Gestring, *U.S. Copper Porphyry Mines Report: The Track Record of Water Quality Impacts Resulting from Pipeline Spills, Tailings Failures, and Water Collection and Treatment Failures* (Washington, DC: Earthworks, July 2012). Accessed December 7, 2015, at https://www.earthworksaction.org/files/publications/Porphyry_Copper_Mines_Track_Record_-_8-2012.pdf.

349 Bonnie Gestring, *U.S. Copper Porphyry Mines Report: The Track Record of Water Quality Impacts Resulting from Pipeline Spills, Tailings Failures, and Water Collection and Treatment Failures* (Washington, DC: Earthworks, July 2012).

350 Bonnie Gestring, *U.S. Copper Porphyry Mines Report: The Track Record of Water Quality Impacts Resulting from Pipeline Spills, Tailings Failures, and Water Collection and Treatment Failures* (Washington, DC: Earthworks, July 2012).

is an open-pit copper mine. Acid leachate has been released numerous times over the years: from 1965-1991, reservoirs used for storing excess surface and leach waters overflowed in heavy rainfall events. In addition, on one occasion a leak in the leach water collection system resulted in a plume of contaminated groundwater.[351]

- The **Freeport McMoran Morenci** (MSHA ID 200024) mine is located northeast of Safford, Arizona. The Morenci mine is an open-pit copper mine with leaching, solvent extraction, and electrowinning operations. It has been operating since 1872. Twenty-one releases were reported between 1992 and 2008, with the vast majority of spills related to pipeline spills and equipment failures. Recent examples include:
    - In 2006, 3,000 pounds of sulfuric acid was released from a pipeline break. That same year, 1,127 pounds of material was released from another pipeline break, and a third pipeline break released rich electrolyte with an acid content of 1,057 pounds.[352]
    - In 2007, a power failure resulted in the release of 1,200,000 gallons of pregnant leach solution.[353]
    - In 2008, a pipeline spill released 186,000 gallons of sulfuric acid and trace elements into Chase Creek, lowering the pH and increasing copper and zinc concentrations for more than two miles downstream.[354]

  Many other releases of sulfuric acid and raffinate from pipelines occurred as well. The cumulative impacts related to the Morenci mine were found to have injured surface waters, terrestrial habitat and wildlife, and migratory birds.[355]

Based on the available documentation, primary concerns for acid leach and SX/EW are proper reclamation of spent dump or heap leach piles, maintenance of equipment, and ensuring that systems are prepared for rainfall events. The most common cause of releases was pipe failure, with chronic seepage from disposal areas, other equipment failures, and weather-related discharges also causing contamination.

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[351] U.S. Environmental Protection Agency, *Record of Decision, Kennecott North Zone Site, Kennecott South Zone Site* (Washington, DC: U.S. Government Printing Office, 2002).

[352] Bonnie Gestring, *U.S. Copper Porphyry Mines Report: The Track Record of Water Quality Impacts Resulting from Pipeline Spills, Tailings Failures, and Water Collection and Treatment Failures* (Washington, DC: Earthworks, July 2012).

[353] Bonnie Gestring, *U.S. Copper Porphyry Mines Report: The Track Record of Water Quality Impacts Resulting from Pipeline Spills, Tailings Failures, and Water Collection and Treatment Failures* (Washington, DC: Earthworks, July 2012).

[354] Bonnie Gestring, *U.S. Copper Porphyry Mines Report: The Track Record of Water Quality Impacts Resulting from Pipeline Spills, Tailings Failures, and Water Collection and Treatment Failures* (Washington, DC: Earthworks, July 2012).

[355] Bonnie Gestring, *U.S. Copper Porphyry Mines Report: The Track Record of Water Quality Impacts Resulting from Pipeline Spills, Tailings Failures, and Water Collection and Treatment Failures* (Washington, DC: Earthworks, July 2012).

G. Pyrometallurgical Processes

Introduction

Pyrometallurgy includes types of mineral processing that use heat to concentrate metals and remove impurities from ore. These processes generally involve oxidizing sulfides into oxides and reducing oxides into metals using a reducing agent such as carbon-based compounds.[356] Many metals, such as aluminum, copper, chromium, gold, iron, lead, nickel, platinum, and silver are commonly concentrated through pyrometallurgical processes, which include drying, calcining, roasting, smelting, and refining.

Historically, pyrometallurgical processes have been associated with significant environmental and human health effects because of their production of criteria air pollutants as well as waste that may include trace elements.[357] As such, they are often regulated by industry-specific requirements under the CAA. Releases of environmental contaminants that appear associated with smelting and related activities, however, continue to occur at currently operating facilities. At the same time, the smelting industry in the U.S. is declining and certain subsets of the industry (such as lead smelting) have closed U.S. operations entirely and/or moved their operations to other countries, at least in part because of more stringent environmental regulations.[358]

Past and Current Use

Simple roasting (exposure to reactive gas) and smelting (melting to remove impurities) processes have existed since prehistoric times, when early humans discovered that smelting could help them concentrate copper and produce bronze. Iron smelting was developed over the 2nd millennium BCE, when new furnace designs enabled the generation of higher temperatures required for iron smelting. Technological advances over the next millennia included the invention of the blast furnace in the 1100s and the invention of the reverberator furnace in the late 1600s, both of which are still in use today. Other advances such as puddling and rolling techniques made these types of furnaces increasingly efficient. By the Industrial Revolution, production capacity had increased greatly.[359]

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[356] Kawatra, S. Komar, "Primary Metal Production," lecture delivered for a class given at Michigan Technological University. Accessed November 5, 2015, at: http://www.chem.mtu.edu/chem_eng/faculty/kawatra/CM2200_Primary_Metals.pdf

[357] U.S. Environmental Protection Agency, *Sector Notebook Project: Profile of the Nonferrous Metals Industry* (Washington, DC: U.S. Government Publishing Office, 1995).

[358] National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[359] F. Habashi, "Fire and the Art of Metals: A Short History of Pyrometallurgy," *Mineral Processing and Extractive Metallurgy* 114:3 (2005), p. 165-71.

Today, various forms of smelting operations are used to process concentrates containing copper, chromium, gold, iron, lead, platinum, silver, tin, and zinc, among other metals.[360] Smelting can introduce pollutants like sulfur dioxide and trace elements, discharged as residue from air filtration systems or from furnace slag.[361]

In the recent decades, concerns about environmental consequences associated with smelting have resulted in the decrease and ultimate closure of some smelting operations in the U.S., particularly primary lead and aluminum smelters. On November 2, 2015, Alcoa Inc. announced that it would reduce its aluminum smelting capacity by 503,000 metric tons by the end of March 2016.[362] This reduction, equivalent to 31 percent of total primary aluminum production in the U.S., will have a significant impact on smelting in the country.[363] U.S. aluminum production will likely continue to decrease: falling aluminum prices are leading primary aluminum production to move to countries which produce aluminum cheaper.[364] For example, China is expected to account for 55 percent of aluminum production in 2015, up from 24 percent in 2005.[365]

Pyrometallurgical processing for lead has halted completely in the United States. In 2013, the last primary lead smelter in the United States (Doe Run Company's operation in Herculaneum, MO) closed. Pyrometallurgical processing as a whole is declining in the U.S., and it is estimated that hydrometallurgical processing (e.g., leaching and solvent extraction) will start to replace smelting in the coming decades.[366]

Technical Description

Pyrometallurgical processing generally occurs after beneficiation of the ore (such as crushing, grinding, or flotation) has taken place. Various pyrometallurgical processes are often carried out in succession, as early steps can help prepare the ore for further pyrometallurgical processing or

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360 U.S. Environmental Protection Agency, Office of Compliance, *Sector Notebook Project: Profile of the Metal Mining Industry* (Washington, DC: U.S. Government Publishing Office, 1995).

361 Hilman C. Ratsch, *Heavy-Metal Accumulation in Soil and Vegetation from Smelter Emissions* (Washington, DC: U.S. Government Printing Office, 1974).

362 "Alcoa Cuts Back on Metal Making as Aluminum Extends Price Slump," Bloomberg Business, November 2, 2015. Accessed November 6, 2015: http://www.bloomberg.com/news/articles/2015-11-02/alcoa-scales-back-metal-making-as-aluminum-extends-price-slump

363 "A 127-Year-Old U.S. Industry Collapses Under China's Weight," Bloomberg Business, November 3, 2015. Accessed November 6, 2015: http://www.bloomberg.com/news/articles/2015-11-03/when-a-127-year-old-u-s-industry-collapses-under-china-s-weight.

364 Aluminum prices have fallen 27 percent in the last year alone. See: "A 127-Year-Old U.S. Industry Collapses Under China's Weight," Bloomberg Business, November 3, 2015. Accessed November 6, 2015: http://www.bloomberg.com/news/articles/2015-11-03/when-a-127-year-old-u-s-industry-collapses-under-china-s-weight.

365 "A 127-Year-Old U.S. Industry Collapses Under China's Weight," Bloomberg Business, November 3, 2015. Accessed November 6, 2015: http://www.bloomberg.com/news/articles/2015-11-03/when-a-127-year-old-u-s-industry-collapses-under-china-s-weight.

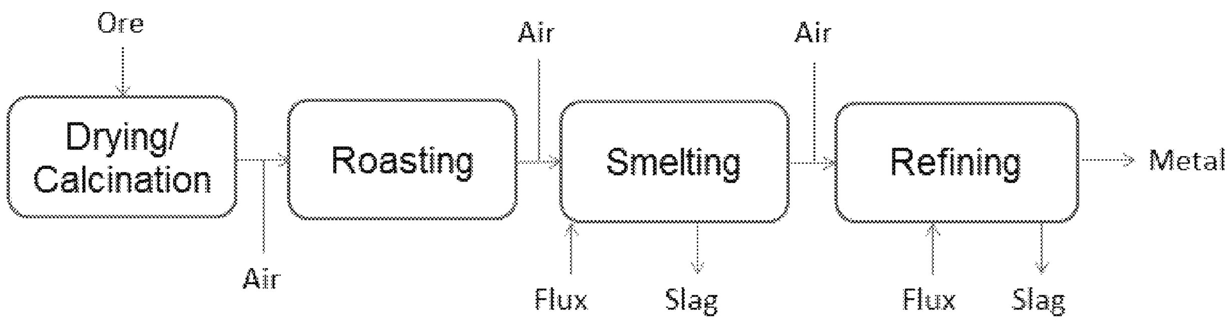
366 National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

other processing techniques such as cyanidation or hydrometallurgical techniques. Early steps generally include some combination of drying, calcination and roasting. Smelting occurs after these initial steps, once the ore has been made more suitable for reduction. After smelting, if the ore is still in need of further purification, the final step consists of refining, which can refer to a wide range of techniques that span both hydrometallurgical and pyrometallurgical methods.[367]

Additives during pyrometallurgical processing are known as fluxes; their purpose is to combine with waste products (apart from gases) and make them easier to separate from the metal product at the working temperature. For example, some ores include waste material that has a high melting point, making it difficult to separate. In these cases, a flux such as lime might be added to combine with the unwanted mineral matter in the ore (gangue), generating a slag with a lower melting point that is easier to handle and separate from the metal product.[368]

The sections that follow summarize the major pyrometallurgical processes. Exhibit 1.F.1. shows these processes in a flow chart.

Exhibit 1.F.1. Simplified Flow Chart of Pyrometallurgical Processing[369]



Drying and Calcination

Drying and calcination describe processes through which mineral ores are heated to release volatile compounds, including water and oxygen, in the absence of additional gas, in order to increase the ratio of target substance to the rock in which it is contained. It is usually the first pyrometallurgical process to take place, and it usually requires no additives. The calcination process derives its name from the decomposition of limestone (*calcium carbonate*) into lime (*calcium oxide)*, although it can be used to describe other processes where volatiles are removed as a gas, including the decomposition of zinc carbonate to zinc oxide, and bauxite (*aluminum hydroxide*) into a form of aluminum (*aluminum oxide*) that is ready to undergo the Hall-Heroult

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[367] Jeanne Mager Stellman, "Chapter 82 - Metal Processing and Metal Working Industry," *Encyclopaedia of Occupational Health and Safety*, (Geneva: International Labour Office/ ILO/ International Labour Organisation, 1998), Volume 4.

[368] S. Ramachandra Rao, *Resource Recovery and Recycling from Metallurgical Wastes* (Amsterdam: Elsevier, 2006).

[369] Adapted from Jain, Ravi, Zengdi Cui, and Jeremy Domen, *Environmental Impact of Mining and Mineral Processing: Management, Monitoring, and Auditing Strategies* (Oxford: Elsevier Butterworth-Hein, 2015).

process described below.[370] Calcination can produce air emissions that contain the volatile compounds released from the ore, including sulfur dioxide, water vapor, and other forms of particulate matter.

Roasting

Unlike drying and calcination, which do not involve adding gases, roasting involves heating the ore and exposing it to a reactive gas in order to remove unwanted compounds present in the ore. Roasting is usually used to convert sulfides to oxides by reaction with air, although the process can also use other gases, such as chlorine. The ore particles react with the gas, and the gaseous waste product is carried away, leaving behind concentrated ore particles. Since the particles do not melt, the reaction starts on the particle surface and gradually works into the particle core.[371] Because the roasting process usually involves removing sulfides from the ore, the most significant pollutant produced is sulfur dioxide, which is regulated under the CAA.

Smelting

Smelting is the process through which ore is melted to remove impurities and further concentrate the final product, generating a molten metal, slag, and waste gas. The impurities are either carried off in the slag or burned off as gas and particulates. In some furnaces, the roasting and smelting processes are combined.

Smelting processes vary greatly based on the ore. The smelting processes for aluminum, copper, and iron all have specific inputs that facilitate the concentration of the metals of interest based on their chemical properties. Generally, however, additives allow the molten metal to be separated and removed from other materials. One example of a smelting process is the Hall-Heroult process, which was invented in the late 1800s and is still the primary method for aluminum smelting. The process dissolves aluminum oxide in a molten salt bath and applies a low voltage current. Molten aluminum is then reduced and isolated, and hydrogen fluoride and other wastes are discarded. During this process, electrical resistance is used to generate temperatures above one thousand degrees Celsius.[372]

Refining

Unlike smelting, refining involves no chemical change to the raw material – it merely purifies the final material instead of altering its makeup. Refining includes a wide range of processes involving both pyrometallurgical and hydrometallurgical techniques, as it refers to any process

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[370] "Process Description Calcination," DGEngineering. Accessed November 5, 2015, at: http://www.dgengineering.de/Rotary-Kiln-Processes-Calcination.html.

[371] Kawatra, S. Komar, "Primary Metal Production," lecture delivered for a class given at Michigan Technological University. Accessed November 5, 2015, at: http://www.chem.mtu.edu/chem_eng/faculty/kawatra/CM2200_Primary_Metals.pdf.

[372] Kawatra, S. Komar, "Primary Metal Production," lecture delivered for a class given at Michigan Technological University. Accessed November 5, 2015, at: http://www.chem.mtu.edu/chem_eng/faculty/kawatra/CM2200_Primary_Metals.pdf.

that helps to increase the grade of a metal.[373] A couple examples of refining methods, which can vary greatly, include the Pattison and the Parkes processes.

Potential Sources of Hazardous Substances

A major environmental concern with pyrometallurgical processes across the board has been the release of sulfur dioxide and other noxious gases and particulate matter released from flues in the furnaces. Other byproducts include liquid waste, slag, sludge, and spent potliners. See Exhibit 1.F.2. for a summary of typical wastes or byproducts associated with pyrometallurgical processing of the major commodities processed in the U.S.

Air Emissions

The most common gaseous release from pyrometallurgical processes is sulfuric dioxide gas (SO_2), although releases have declined with regulations and continuing advances in engineering over the last several decades. Annual releases of SO_2 from metal processing totaled 4,775 thousand tons in 1970, but by 1980 emissions were down to 1,842 thousand tons. Continuing this trend, emissions decreased to 530 thousand tons by 1995, and 144 thousand tons in 2014.[374] Current practices require that these emissions be captured, and they are now typically converted to sulfuric acid.

More efficient and environmentally-conscious smelting processes have been developed as technologies and environmental regulations have evolved. Electrostatic precipitators, for example, use electric charges to attract small particles out of flue-based discharges, while baghouses use fine fabric meshes to filter out similar sets of particulate matter. Use of these technologies can remove 99 percent of toxic metal particles and 99.99 percent of dust.[375,376] Ideally, the baghouse dust is recycled. If not, it is disposed of in a hopper.[377] The dust is a hazardous waste that is subject to solid waste management guidelines.

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373 Ahindra Ghosh, *Principles of Extractive Metallurgy*, Second Edition, (New Delhi: New Age International, 1991).

374 "National Emissions Inventory Air Pollutant Emissions Trends Data: 1970-2014 Average annual emissions, all criteria pollutants," U.S. Environmental Protection Agency, updated March, 2015. Accessed November 5, 2015, at https://www.epa.gov/air-emissions-inventories/air-pollutant-emissions-trends-data.

375 United Nations Environment Programme, United Nations Industrial Development Organization, and the World Bank Group, *Pollution Prevention and Abatement Handbook, Airborne Particulate Matter: Pollution Prevention and Control* (Washington DC: World Bank, 1998).

376 T. Moore, "Hazardous Air Pollutants: Measuring in Micrograms," *EPRI Journal* 19:1 (1994), p. 33-37.

377 U.S. Environmental Protection Agency, *Air Pollution Cost Control Manual*, Sixth Edition (Washington, DC: U.S. Government Printing Office, 2002), Section 6, Chapter 1.

Exhibit 1.F.2. Potential Releases Associated with Pyrometallurgy[378, 379]

METAL	PROCESS	MATERIAL INPUT	AIR EMISSIONS	LIQUID WASTE	OTHER WASTES
Copper	Copper smelting	Copper concentrate, siliceous flux	Sulfur dioxide, particulate matter containing arsenic, antimony, cadmium, lead, mercury and zinc	None	Acid plant blowdown slurry/sludge, slag containing iron sulfides, silica
Lead	Lead smelting	Lead sinter, coke	Sulfur dioxide, particulate matter containing cadmium and lead	Plant washdown wastewater, slag granulation water	Slag containing impurities such as zinc, iron, silica and lime, surface impoundment solids
Zinc	Zinc calcining	Zinc ore, coke	Sulfur dioxide, particulate matter containing zinc and lead	None	Acid plant blowdown slurry
Aluminum	Alumina calcination	Aluminum hydrate	Particulates and water vapor	None	None
	Primary electrolytic aluminum smelting	Alumina, carbon anodes, electrolytic cells, cryolite	Fluoride—both gaseous and particulates, carbon dioxide, sulfur dioxide, carbon monoxide, C2F6,CF4 and perfluorinated carbons (PFC)	None	Spent potliners
Iron	Iron smelting using a blast furnace	Iron ore or sinter, coke, limestone or dolomite	Sulfur dioxide, carbon monoxide	Coolant containing zinc, tar, and lime residue	Slag containing sulfur, magnesium, and/or silicon-based compounds

378 Jeanne Mager Stellman, "Chapter 82 - Metal Processing and Metal Working Industry," *Encyclopaedia of Occupational Health and Safety*, (Geneva: International Labour Office/ ILO/ International Labour Organisation, 1998), Volume 4.

379 U.S. Environmental Protection Agency, "Iron and Steel," in *Identification and Description of Mineral Processing Sectors and Waste Streams* (Washington, DC: U.S. Government Printing Office, 2012). Accessed November 5, 2015, at https://archive.epa.gov/epawaste/nonhaz/industrial/special/web/pdf/id4-hfa.pdf

Several mining companies also have flue gas desulfurization (wet scrubber) systems at their sites. These alkaline slurries chemically neutralize the acid gas before it is released into the atmosphere, often removing upwards of 90 percent of SO_2 from flue gases.[380] Scrubbing processes also pull many of the other pollutants out of the waste gas, including arsenic, lead, and zinc.

Liquid Waste

Wastewater generated by the wet scrubbing and slag cooling processes is a major source of liquid waste in pyrometallurgical processes. Though most wastewater from the wet scrubbing process can be recycled for future use, smelters in the 1970s and early 1980s would often discharge or “blow down” a small amount of wastes in order to minimize corrosion and buildup of solids. Over the next ten years, several plants abandoned this practice, instead using various separation techniques to extract target metals from the solid wastes. Other plants began to neutralize these wastes and discharge them into lined surface impoundments or wastewater treatment facilities.[381] By the mid-1990s, lead smelters had ceased storing wastewater from the slag quenching process in unlined surface impoundments, and instead recycled the solids back into the smelting process.[382] Other smelters adopted similar approaches over this time, either recycling sludges back into the smelting process or neutralizing these wastes with lime or magnesium before selling the resulting product or sending it to special landfills.[383]

Other Wastes

Slag, the collection of compounds removed from the molten metal product, is created during smelting. Some types of slag can be commercial products and are considered relatively benign; for example, iron and steel slag can be sold for use in construction or cement.[384]When slag is produced, however, it is very hot. Slag that is not intended for reuse can be air cooled, but slag that may be sold often requires quenching with water, producing wastewater that can contain harmful substances (discussed above). In addition, many types of slag have been a source of some environmental contamination. Nonferrous slag in particular contains elements that are of

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[380] G. Hilson, "Pollution prevention and cleaner production in the mining industry: an analysis of current issues," *Journal of Cleaner Production* 8 (2000), p. 119-126.

[381] U.S. Environmental Protection Agency, Office of Solid Waste, *Technical Background Document: Remanded Smelting Wastes* (Washington, DC: U.S. Government Printing Office, 1995). Accessed at: http://www.epa.gov/osw/nonhaz/industrial/special/mining/minedock/smelt/remsmelt.pdf

[382] U.S. Environmental Protection Agency, Office of Solid Waste, *Technical Background Document: Remanded Smelting Wastes* (Washington, DC: U.S. Government Printing Office, 1995).

[383] U.S. Environmental Protection Agency, Office of Solid Waste, *Technical Background Document: Remanded Smelting Wastes* (Washington, DC: U.S. Government Printing Office, 1995).

[384] D.M. Proctor, E.C. Shay, K. A Fehling, and B.L. Finley, “Assessment of human health and ecological risks posed by the use of steel-industry slags in the environment,” *Human Ecological Risk Assessment* 8 (2002), p. 681–711.

concern – some types of slag contain concentrations of aluminum, chromium, copper, iron, manganese, lead, and zinc that exceed EPA soil screening levels for human contact.[385]

Blowdown slurry and sludge, which result from the sulfur recovery process, qualifies as a hazardous waste and is regulated under RCRA.[386]

State and Federal Regulations

At both the federal and state level, environmental regulations address potential environmental releases from pyrometallurgical processing, particularly smelting. While some smelting wastes are excluded from regulation under RCRA Subtitle C, many are regulated as hazardous wastes and face strict reporting and management requirements. Additionally, the CAA and CWA regulate releases to air and water, including industry-specific guidelines for pyrometallurgical processing of minerals.

Federal Regulations

Nonferrous metal manufacturing facilities, including smelting and refining operations for several primary metals must comply with ELGs under the CWA.[387] Processing facilities each obtain permits under NPDES, which specify water quality requirements and operating standards related to process wastewater and stormwater from industrial activity based on ELGs.

Solid wastes from pyrometallurgical processes include residues from air filtration systems and furnace slags from thermal processing. RCRA exempts many types of mineral processing wastes under the Bevill Amendment, including several types of smelting and refining wastes.[388] State and local governments implement solid waste management guidelines under RCRA Subtitle D. Emissions control dust from baghouses in iron and steel production (waste code K061) and spent potliners from the Hall-Heroult process from aluminum reduction (waste code K088) are specifically regulated as RCRA hazardous wastes.

As outlined in Exhibit 1.F.3., the CAA, passed in 1970 and amended in 1977 and 1990, regulates air emissions from many mineral processing sectors at the federal level. Section 111 of the CAA requires the EPA to establish federal emission standards for industrial source categories which cause or contribute significantly to air pollution. Accordingly, EPA promulgated NSPS at 40

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385 Nadine M. Piatak, Michael B. Parsons, and Robert R. Seal, "Characteristics and Environmental Aspects of Slag: A Review," *Applied Geochemistry* 57 (2015), p. 236-66.

386 Jeanne Mager Stellman, "Chapter 82 - Metal Processing and Metal Working Industry," *Encyclopaedia of Occupational Health and Safety*, (Geneva: International Labour Office/ ILO/ International Labour Organisation, 1998), Volume 4.

387 Regulated facilities include aluminum smelting, copper smelting, electrolytic copper refining, lead smelting, and rare earths ores processing. 40 CFR Part 421. Promulgated in 1974-1976, revised in 1980-1990. See: "Nonferrous Metals Manufacturing Effluent Guidelines," U.S. Environmental Protection Agency. Accessed November 5, 2015, at: http://water.epa.gov/scitech/wastetech/guide/nfmm/.

388 U.S. Environmental Protection Agency, Office of Solid Waste, *Technical Background Document: Remanded Smelting Wastes* (Washington, DC: U.S. Government Printing Office, 1995).

Exhibit 1.F.3. National Emission Standards for Hazardous Air Pollutants Relevant to Hardrock Mining and Mineral Processing

INDUSTRIAL SECTOR	NESHAP	NSPS	CITATIONS
Ferroalloys production	✓	✓	**NESHAP:** 40 CFR 63, Subpart XXX (*major sources*); 40 CFR 63 Subpart YYYYYY(*area sources*) **NSPS:** 40 CFR 60 Subpart Z, 60.260-266
Iron and steel processing[389]	✓	✓	**NESHAP:** 40 CFR 63, Subpart EEEEE (Iron and steel foundries - major sources); 40 CFR Part 63 Subpart YYYYY (Electric Arc Steelmaking Facilities – area sources); 40 CFR 63, Subpart ZZZZZ (area sources); 40 CFR 63 Subpart RRRRR (Taconite iron ore processing - major sources) **NSPS:** 40 CFR 63, Subpart YYYYY (Electric Arc Furnace Steelmaking Facilities – area sources)**;** 40 CFR 60 Subpart AA, and AAa, 60.270-276 (Electric arc furnaces – major sources); 40 CFR 60 Subpart Na, 60.140a-145a (Secondary emissions from basic oxygen process steelmaking facilities constructed after 1/20/1983)
Gold mine ore processing and production	✓		**NESHAP:** 40 CFR 63, Subpart EEEEEEE *(area sources)*
Primary aluminum reduction plants	✓	✓	**NESHAP:** 40 CFR 63, Subpart LL (*major sources*) **NSPS**: 40 CFR 60 Subpart S, 60.190-60.195
Primary lead production	✓	✓	**NESHAP:** 40 CFR 63, Subpart TTT (*major sources*) **NSPS:** 40 CFR 60 Subpart R, 60.180-186
Primary copper production	✓	✓	**NESHAP:** 40 CFR 63, Subpart QQQ (Primary copper – major sources); 40 CFR 63, Subpart EEEEEE (Primary copper smelting – area sources); 40 CFR 63, Subpart ZZZZZZ (Aluminum, copper, and other nonferrous foundries - area sources); 40 CFR 63, Subpart J (PVC and copolymers production, primary copper smelting, secondary copper smelting, and primary nonferrous metals: zinc, cadmium, and beryllium) **NSPS:** 40 CFR 60 Subpart P, 60.160-166 (*Primary copper smelters*)

[389] While the RCRA exempts many types of mineral processing wastes, emissions control dust from baghouses in iron and steel production is specifically regulated as RCRA hazardous waste (waste code K061).

INDUSTRIAL SECTOR	NESHAP	NSPS	CITATIONS
Primary magnesium refining	✓		**NESHAP:** 40 CFR 63, Subpart TTTTT (Primary magnesium refining - major sources)
Other nonferrous metals processing	✓	✓	**NESHAP:** 40 CFR 63, Subpart ZZZZZZ (Aluminum, copper, and other nonferrous foundries - area sources); 40 CFR 63, Subpart J (PVC and copolymers production, primary copper smelting, secondary copper smelting, and primary nonferrous metals: zinc, cadmium, and beryllium); 40 CFR 63, Subpart GGGGGG (Primary nonferrous metals: zinc, cadmium, and beryllium – area sources) **NSPS:** 40 CFR 60 Subpart Q, 60.170-176 (*Primary zinc smelters*); 40 CFR 60 Subpart LL, 60.380-386 *(Metallic Mineral Processing Plants)*
Nonmetallic Mineral Processing Plants		✓	**NSPS:** 40 CFR 60 Subpart OOO, 60.670-676 *(Nonmetallic mineral processing plants)*
Phosphates	✓	✓	**NESHAP:** 40 CFR 63, Subparts AA and BB (Phosphoric acid manufacturing and phosphate fertilizers) **NSPS:** 40 CFR 60 Parts T-X *(Phosphate fertilizer industry)*; 40 CFR 60 Subpart NN, 60.400-404 *(Phosphate rock plants)*

CFR Part 60. These standards apply to sources that have been constructed or modified since the promulgation of each standard.

Section 112 of the CAA addresses emissions of hazardous air pollutants, which are known or suspected to cause cancer or other serious health effects. The 1990 CAA Amendments directed the EPA to issue technology-based standards for industrial categories emitting hazardous air pollutants. Consequently, over the past 25 years, EPA has promulgated NESHAPs at 40 CFR Part 63 for multiple industrial sources. Major sources, which emit 10 tons per year of a single hazardous air pollutant or 25 tons per year of any combination of hazardous air pollutants, must follow hazardous air pollutant standards that require Maximum Achievable Control Technology (MACT) standards. Non-major sources may be regulated as "area sources." Specific control requirements vary by source. Requirements include:

- Technology-based performance standards
- Operational requirements
- Emission limits

Generally, state and local air pollution control agencies are responsible for implementation and enforcement of these CAA air standards. EPA reviews and approves state programs to maintain a consistent national regulatory framework.

The following exhibit illustrates the specific applicability of NSPS and NESHAP regulations to primary mineral processing facilities.

State Regulations

Many states have delegated authority under the CAA to regulate industrial sources of air pollution. Five states have partial delegated authority for the industry-specific NESHAP,[390] while three have full delegated authority.[391] For NSPS implementation, four states have partial delegated authority[392] and three have full delegated authority.[393] EPA implements the NSPS programs for one state.[394] Five states (Arizona, California, Idaho, Minnesota, and Nevada) also have separate state-level air toxics programs. Of these, we identified several programs with technical standards specifically designed for primary processing operations. We summarize them below:

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[390] Alaska, Arizona, California, Idaho, and Nevada.

[391] Minnesota, Montana, and Utah. From: "Clean Air Act," The Environmental Council of the States (ECOS) State Delegations. http://www.ecos.org/section/states/enviro_actlist/states_enviro_actlist_caa

[392] Alaska, Arizona, California, and Nevada.

[393] Minnesota, Montana, and Utah.

[394] Idaho.

- California Emissions of Toxic Metals from Non-Ferrous Metal Melting Airborne Toxic Control Measures: Non-ferrous metal melting furnaces, including reverberatory, induction, and direct arc furnaces, must have an emissions collection system, undergo testing, and use fugitive emissions control systems. (7 CCR 93107)
- Nevada Mercury Control Program: In 2002, Nevada's Voluntary Mercury Air Emission Reduction Program established emission reduction goals.[395] Nevada also requires additional MACT for mercury emissions on thermal units at existing and new metal mines. All users of thermal units at existing metal mines must apply for a Mercury Operating Permit to construct before constructing thermal units. (NAC 445B.3611 – 445B.3689)

Non-Operating Sites and Currently Operating Facilities

Non-Operating Sites

Smelting was identified as a practice at 12 sites of the sample of 29 non-operating sites reviewed.[396] The most common commodities processed at these sites were lead, zinc, copper, gold, and silver.[397] Releases directly related to smelting were identified at three of the 12 sites in this sample.[398] These releases came in the form of airborne emissions, including lead, cadmium, arsenic, and particulate matter, and occurred both before and after the promulgation of air regulations:

- **National Zinc Corp.** (EPA ID OKD000829440): The National Zinc Corporation operated a zinc smelter in Bartlesville, Oklahoma from 1907 to 1976.[399] The smelter did not have air emission controls, which allowed emissions to be deposited downwind.[400] Blood lead studies in 1991 and 1992 funded by Agency for Toxic Substances and Disease Registry (ATSDR) and performed by Oklahoma State Department of Health (OSDH), now ODEQ) indicated that approximately 14 percent of the children in the contaminated

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[395] In 2003, Nevada produced 82 percent of the gold mined in the United States. The TRI for Nevada indicates that four Nevada mining companies emitted roughly 90 percent of the state's reported mercury air emissions in 2001. For more information, see: EPA. 2010. Fact Sheet: Final Rule to Reduce Mercury Emissions from Gold Mine Ore Processing and Production Sources. Accessed February 13, 2015 at http://www.epa.gov/ttn/atw/area/gold_mines_fs_121610.pdf

[396] Tex-Tin Corp. (EPA ID TXD062113329), Asarco, Inc. (Globe Plant) (EPA ID COD007063530), California Gulch (EPA ID COD980717938), Summitville Mine (EPA ID COD983778432), Bunker Hill Mining & Metallurgical Complex (EPA ID IDD048340921), Eagle Zinc Co. Div. TL Diamond (EPA ID ILD980606941), East Helena Site (EPA ID MTD006230346), Omaha Lead (EPA ID NESFN0703481), Shieldalloy Corp. (EPA ID NJD002365930), Li Tungsten Corp. (EPA ID NYD986882660), National Zinc Corp. (EPA ID OKD000829440), Tar Creek (Ottawa County) (EPA ID OKD980629844).

[397] Seven sites processed zinc, seven sites processed lead, five sites processed copper, five sites processed gold, and five sites processed silver.

[398] East Helena Site (MTD006230346), Omaha Lead (NESFN0703481), National Zinc Corp. (OKD000829440)

[399] "Superfund Program: National Zinc Corp., Bartlesville, OK," U.S. Environmental Protection Agency. Accessed November 11, 2015: https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0601010.

[400] "Superfund Program: National Zinc Corp., Bartlesville, OK," U.S. Environmental Protection Agency. Accessed November 11, 2015: https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0601010.

area had elevated levels of blood lead greater than 10 micrograms per deciliter. Contaminants of concern at the National Zinc Corporation site are lead and cadmium in air dispersion and slag material contaminated soils.

- **Omaha Lead** (EPA ID NESFN0703481): The Omaha Lead site occupies 20 square miles in downtown Omaha, Nebraska.[401] Two lead smelting facilities operated on the site. ASARCO smelted and refined lead from the early 1870s until 1996.[402]

The ASARCO facility emitted lead and other trace elements from smokestacks. Wind transported the pollutants, which were eventually deposited on nearby land.[403]Ambient air quality tests, conducted by the Douglas County Health Department (DCHD) in 1984, measured lead concentrations exceeding the ambient standard of 1.5 micrograms per cubic meter.[404] The highest measurement by DCHD was 6.57 micrograms per cubic meter.[405] DCHD found elevated blood lead levels in children living near the Omaha Lead site, compared to the national average.[406] Soil sampling indicated significant lead contamination in the surrounding area.[407] The site was added to the NPL list on April 30, 2003.[408]

- **East Helena Site** (EPA ID MTD006230346): The East Helena site occupies 8.4 square miles near East Helena, Montana. The site included a primary lead smelter and a primary zinc smelter, which emitted lead, cadmium, and arsenic compounds during its operational period of 1888 until 2001.[409] Despite mitigation steps, including the installation of an acid plant to control sulfur dioxide emissions, the facility exceeded sulfur dioxide emissions in 1978 and 1980.[410] In 1981, the facility added a tall stack to the blast furnace baghouse to reduce ground-level emissions. The site was added to the NPL in 1983.

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[401] U.S. Environmental Protection Agency, *Omaha Lead Site Interim Record of Decision* (Washington, DC: U.S. Government Printing Office, 2004).

[402] "Superfund Sites – NPL. Omaha Lead," U.S. Environmental Protection Agency. Accessed October 30, 2015: http://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0703481.

[403] "Superfund Sites – NPL. Omaha Lead," U.S. Environmental Protection Agency. Accessed October 30, 2015: http://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0703481.

[404] U.S. Environmental Protection Agency, *Omaha Lead Site Interim Record of Decision* (Washington, DC: U.S. Government Printing Office, 2004).

[405] U.S. Environmental Protection Agency, *Omaha Lead Site Interim Record of Decision* (Washington, DC: U.S. Government Printing Office, 2004).

[406] U.S. Environmental Protection Agency, *Omaha Lead Site Interim Record of Decision* (Washington, DC: U.S. Government Printing Office, 2004).

[407] U.S. Environmental Protection Agency, *Omaha Lead Site Interim Record of Decision* (Washington, DC: U.S. Government Printing Office, 2004).

[408] U.S. Environmental Protection Agency, *Omaha Lead Site Interim Record of Decision* (Washington, DC: U.S. Government Printing Office, 2004).

[409] "Superfund Program: East Helena Site, East Helena, MT," U.S. Environmental Protection Agency. Accessed November 11, 2015: http://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0800377.

[410] U.S. Environmental Protection Agency, *EPA Superfund Record of Decision: East Helena Site* (Washington, DC: U.S. Government Printing Office, 1989).

Currently Operating Facilities

Five of the 70 currently operating facilities reviewed use primary smelting as a processing technique.[411] Two of these facilities, ASARCO Ray Hayden Complex (MSHA IDs 0200826 and 0200150) and Rio Tinto Kennecott Bingham Canyon-Copperton-Magna (MSHA IDs 4200149 and 4201996) produce copper. Stillwater mine (MSHA ID 2401490) produces platinum, US Antimony Montana produces antimony, and Nyrstar Clarksville is the only primary zinc facility in the United States. EPA's Toxics Release Inventory (TRI) data indicate that the ASARCO Ray Hayden Complex and Nyrstar Clarksville released air emissions. ASARCO had a permit for air emissions from its smelter, although the emissions led to the presence of contaminants in higher than expected levels in two nearby towns.[412,413] Emissions from the Nyrstar facility contain compounds typical to smelting activities (e.g., zinc, cadmium, lead, and copper), available documentation does not provide direct evidence that smelting or other pyrometallurgical processes caused these releases or if Nyrstar had a permit for the releases.[414]

Releases of contaminants have been observed both before and after the promulgation of major environmental regulations, suggesting that technological advances and regulatory oversight may have not eliminated the potential for environmental contamination.

ASARCO Ray Hayden Complex (MSHA IDs 0200826 and 0200150)[415]

The ASARCO Ray Hayden Complex includes the Ray surface copper mine and concentrator and the Hayden smelter. The Ray mine began operations in 1880 and the Hayden smelter began operations in 1920. The Ray facility extracts and crushes copper ore, before it is processed and smelted at the Hayden facility.

Smelting conducted at the facility both before and after the promulgation of environmental regulations has resulted in elevated levels of lead, arsenic, and copper in nearby land. A 1,000-foot tall smokestack was constructed in 1974 to reduce ground-level emissions. Yet, air quality monitoring in the two neighboring towns, Hayden and Winkelman, Nevada, measured elevated levels of arsenic, lead, copper, cadmium, and chromium from site operations in 2013 and

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[411] Asarco Ray (MSHA IDs 0200826 and 0200150), Nyrstar Clarksville (MSHA ID Unknown), RioTinto Kennecott Bingham Canyon-Copperton-Magna (MSHA IDs 4200149 and 4201996), Stillwater Stillwater/Columbus (MSHA ID 2401490), US Antimony Montana (MSHA ID Unknown).

[412] Arizona Department of Environmental Quality, "Air Quality Permit No. 1000042 for the Asarco Hayden Smelter," October 10, 2001.

[413] U.S. Environmental Protection Agency Region 10, *Administrative Settlement Agreement and Order on Consent for Asarco Hayden Plant Site* Docket No. CERCLA-2008-13, April 15, 2008.

[414] TRI reported air emissions from the Nyrstar Facility: zinc, cadmium, lead, manganese, and copper compounds. Air emissions from the Ray Hayden Facility: arsenic, barium, antimony, zinc, mercury, selenium, nickel, cadmium, manganese, silver, chromium, cobalt, copper, and lead compounds, and sulfuric acid.

[415] "Superfund Site – Asarco Hayden Plant," U.S. Environmental Protection Agency Region 9. Accessed October 30, 2015: http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/ViewByEPAID/AZD008397127#area.

2014.[416] The facility is conducting cleanup under a 2008 CERCLA administrative consent order (EPA ID AZD008397127). As of January 2015, the facility had been in significant violation of its CAA permit for at least the past three years.[417]

Additionally, data in ERNS indicate that at least one release at the complex was directly related to smelting activity. In 2002 blowdown equipment failure of the Hayden smelter led to a release of 1.37 pounds of arsenic compounds. While other data directly linking releases at the complex to smelting are limited, there are 88 releases reported to ERNS attributed to the complex, many of them of compounds typically associated with smelting.

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[416] "Asarco Hayden Plant: Site Updates and Upcoming Public Meeting," U.S. Environmental Protection Agency Region 9. Accessed October 30, 2015: http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/3dc283e6c5d6056f88257426007417a2/6b0358416fdb7e3288257d9000669ee8/$FILE/70348280.pdf/Asarco%2010_14.pdf.

[417] "Enforcement and Compliance History Online (ECHO): Ray Mine Unit and Hayden Smelter (FRS ID 110000471338)," U.S. Environmental Protection Agency. Accessed October 30, 2015, at: http://echo.epa.gov/detailed-facility-report?fid=110000471338.

H. Bayer Process

Introduction

In nature, metallic aluminum is never found in its pure form; it almost always exists in the form of hydrated oxides or silicates, which are usually contained in an ore called bauxite. The Bayer process is the key industrial method for turning this ore into aluminum oxide (known as alumina), which can then undergo electrolytic smelting for further purification. The process involves dissolving the ore in a sodium hydroxide solution, which allows the alumina to be precipitated out and the waste ore to be carried away as red mud. While red mud is not classified as hazardous under RCRA Subtitle C, large volumes are produced, making proper disposal an important issue.[418] Limits for the amount of wastewater overflow and discharges from impoundments such as red mud lakes are set by the CWA ELGs for the nonferrous metals manufacturing point-source category. Louisiana and Texas, where U.S. bauxite refining facilities currently operate, also regulate red mud under solid waste regulations, requiring operating and closure standards for surface impoundments holding processing waste. Limited evidence from non-operating Superfund sites indicates that hazardous substance releases from red mud disposal areas occurred at two sites engaged in Bayer processing, leading to contamination of surrounding environment, including surface water. No evidence exists of red mud releases from currently operating facilities in the U.S., although one site received complaints regarding dust emitted from the red mud lagoons.

In addition, sodium hydroxide, used to dissolve the ore during the Bayer process, is highly corrosive and can pose human health and environmental risks if released.[419] As a hazardous process chemical, it faces handling, transportation, and management requirements under RCRA Subtitle C. Releases of sodium hydroxide due to equipment failure and operator errors have occurred historically, as well as at currently operating sites within the reviewed sample.

Past and Current Use

The Bayer process was invented in Russia in 1888 by chemist Karl Josef Bayer. It was immediately accepted into industrial practices, largely replacing the earlier Le Chatelier process and becoming the primary method of alumina production worldwide. Although improvements in engineering have decreased the costs, the Bayer process itself has remained relatively unchanged since that time, and is still used to produce nearly all of the world's alumina supply.[420]

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418 Dietrich G. Altenpohl, *Aluminum: Technology, Applications and Environment: A Profile of a Modern Metal from Within* (Malden, MA: Wiley, 1998).

419 "Hazardous Substance Fact Sheet: Sodium Hydroxide," New Jersey Department of Health. Accessed November 12, 2015, at http://nj.gov/health/eoh/rtkweb/documents/fs/1706.pdf.

420 Fathi Habashi, "Bayer's Process for Alumina Production: A Historical Perspective," *Bulletin of Historical Chemistry* 17/18 (1995), p. 15-19.

Primary aluminum processing production in the United States (and thus, use of the Bayer process) reached its peak of 4,654,000 metric tons in 1980, and has been generally trending down (with some fluctuations) since then. Recent years' production ranged from 1,727,000 metric tons in 2009 to 1,946,000 metric tons in 2013.[421] Nearly all bauxite ore, the ore processed to produce aluminum, originates from overseas mining operations; thus no U.S. mining facilities produce bauxite ore.[422]

Technical Description

The Bayer process converts bauxite ore (a hydrated oxide of aluminum consisting of 30 to 56 percent alumina as well as iron, silicon, and titanium) to crystalline alumina that is suitable for electrolysis. The crude bauxite ore is crushed and ground before being mixed with a preheated solution of caustic soda (sodium hydroxide). Lime is often added at this stage to control phosphorus content and improve the solubility of alumina. This slurry is then pumped into heated pressure chambers, which dissolves the ore into sodium aluminate. Iron, titanium, and other impurities settle out of this solution, because they are not affected chemically and remain solid. These solids are the primary waste material from the Bayer process, known as red mud. They are separated from the sodium aluminate solution, washed, and then pumped to disposal areas. The washwater, which contains caustic soda, is recycled to the process.

The sodium aluminate solution is then cooled (usually by the washwater from the waste product) and seeded with alumina crystals from a previous cycle, which supersaturates the solution. This forces the alumina to precipitate out. Alumina is then washed and filtered before undergoing calcination in rotating furnaces called rotary kilns, which readies it for further processing to turn it into aluminum metal (generally through the Hall-Heroult process).[423, 424] See Exhibit 1.H.1. for a simplified diagram of the Bayer process.

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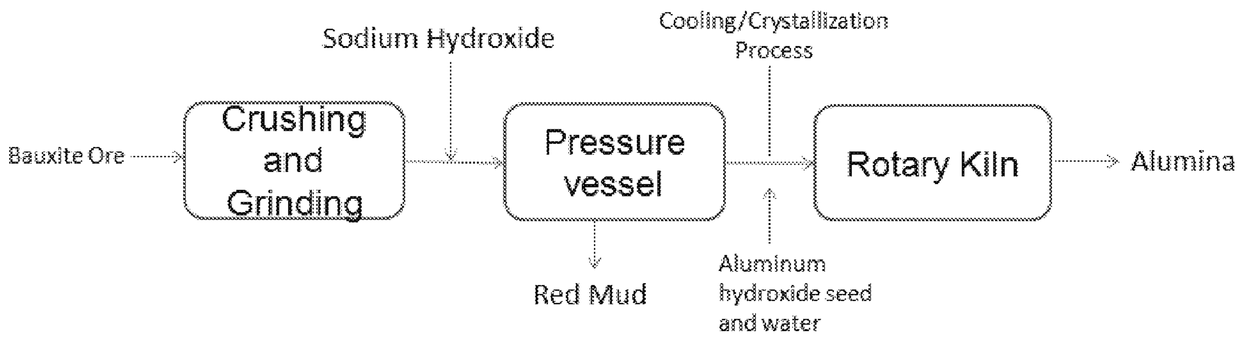
[421] "Historical statistics for mineral and material commodities in the United States: Aluminum," Thomas D. Kelly and Grecia R. Matos, U.S. Geological Survey Data Series 140, updated 2013. Accessed Nov. 10, 2015, at http://minerals.usgs.gov/minerals/pubs/historical-statistics/.

[422] "Minerals Commodity Summary: Bauxite and Alumina," U.S. Geological Survey, updated 2015. Accessed Dec. 10, 2015, at: http://minerals.usgs.gov/minerals/pubs/commodity/bauxite/mcs-2015-bauxi.pdf.

[423] Dietrich G. Altenpohl, *Aluminum: Technology, Applications and Environment: A Profile of a Modern Metal from Within* (Malden, MA: Wiley, 1998).

[424] U.S. Environmental Protection Agency, "Chapter 12: Introduction to Metallurgical Industry," in *AP 42 Emissions Factors*, Fifth Edition (Washington, DC: U.S. Government Printing Office, 1998), Volume I.

Exhibit 1.H.1. Simplified Flow Chart of the Bayer Process



Potential Sources of Hazardous Substances

The major environmental concern associated with the Bayer process is red mud, which is produced in large quantities.[425] Red mud is made up primarily of iron, aluminum, silica, calcium and sodium, but can contain other trace elements depending on the composition of the original bauxite ore. While these trace elements are generally only present in low concentrations and are rarely considered a serious threat to health, arsenic, chromium, and radium-226 could pose concerns in some cases. In addition, red mud is highly alkaline, which has negative effects on plant life in surrounding areas.[426]

Usually, red mud is deposited in large on-site surface impoundments ("red mud lakes"), where the mud settles to the bottom and the water is removed and treated. In these "lakes," the mud builds up in place and dries to a solid. After at least 25 years, these areas can be revegetated, although they generally require some topsoil modification because of the high alkalinity, salinity and sodicity (sodium content) of red mud.[427]

Releases associated with the Bayer process generally occur in three general ways. First, the berms or dikes used to contain red mud lakes can fail and release the mud itself. Second, releases can occur once the lakes have dried up. Finally, precipitation can cause elements such as arsenic and selenium to leach from the red mud, or wind erosion can release fine particles of red mud into the air. EPA investigated risks associated with these types of releases in 1990, however, and found that the potential for danger to health and the environment is generally low.[428]

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[425] Depending on the grade of the bauxite ore, the Bayer process can produce one to two times as much red mud as it does alumina. See Dietrich G. Altenpohl, *Aluminum: Technology, Applications and Environment: A Profile of a Modern Metal from Within* (Malden, MA: Wiley, 1998).

[426] U.S. Environmental Protection Agency, *Report to Congress on Special Wastes from Mineral Processing* (Washington, DC: U.S. Government Printing Office, 1990).

[427] J. Wong, "Use Of Waste Gypsum In The Revegetation On Red Mud Deposits: A Greenhouse Study," *Waste Management & Research* 11:3 (1993), p. 249-56.

[428] U.S. Environmental Protection Agency, *Report to Congress on Special Wastes from Mineral Processing* (Washington, DC: U.S. Government Printing Office, 1990).

Other hazardous releases that can stem from the Bayer process include fugitive dust from early physical processing, and sodium hydroxide. There is little evidence that fugitive dust has been a concern, and typical methods of containment from physical processing can be used to minimize these risks. Sodium hydroxide is highly corrosive and can pose human health and environmental risks if released, but as it is generally recycled back into the process, potential for releases is generally low.[429]

See Exhibit 1.H.2. for a summary of potential releases and best management practices for minimizing these risks.

State and Federal Regulations

While few regulations pertain specifically to the Bayer process, or alumina processing in general, broad regulatory frameworks address these practices at the state and federal level. See Section 2.C.4. for broader discussion of the regulations applicable to tailings (including red mud).

Federal Regulations

RCRA (the Bevill Amendment) exempts red mud from regulation as hazardous waste under RCRA Subtitle C. State and local governments implement solid waste management guidelines under RCRA Subtitle D. EPA's authority under Subtitle D is limited; its primary role is to promulgate sanitary landfill criteria to prevent adverse effects on health or the environment. As of 2013, EPA has not finalized any solid waste management requirements specifically applicable to the disposal of Bevill waste.[430]

In situations where facilities combine tailings with mineral processing wastes that exhibit hazardous characteristics, these waste mixtures may also fall under RCRA Subtitle C. Red and brown muds from bauxite refining, however, are specifically excluded by the Bevill Amendment from regulation under RCRA Subtitle C. Finally, the MSHA specifies inspections and safety standards for impoundments, retention dams, and tailings ponds, and the FEMA is charged with administering a national dam safety program that includes surface impoundment structures.[431]

[429] "Hazardous Substance Fact Sheet: Sodium Hydroxide," New Jersey Department of Health. Accessed November 12, 2015, at http://nj.gov/health/eoh/rtkweb/documents/fs/1706.pdf.

[430] L. Luther, "Background on and Implementation of the Bevill Bentsen Exclusions in the Resource Conservation and Recovery Act: EPA Authorities to Regulate 'Special Wastes,'" *Congressional Research Service* R43149 (Washington, DC: U.S. Government Printing Office, 2013).

[431] 30 CFR Part 57, Subpart S. For more information, see: "Dam Safety Standards and Technical Guidance," MSHA. U.S. Department of Labor. Accessed October 30, 2015, at: http://www.msha.gov/DamSafety/DamSafetyTechGuidance.asp.

Exhibit 1.H.2. Potential Releases Associated with the Bayer Process

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
Fugitive Dust	The early stages of the Bayer process (crushing and grinding) may release dust.	The following practices help to manage fugitive dust[432]: • Application of water through wet spray systems • Enclosure of the dust source • Exhaust ventilation • Maintenance of a slight negative pressure for enclosed grinding equipment, which ensures that any air leakage will flow into and not out of the equipment.
Red Mud	Red mud is the waste material that is removed from the target metal during the Bayer process. [433] It contains iron, aluminum, silica, calcium and sodium, depending on the original ore used. Although red mud by itself is not toxic, it is extremely alkaline with a pH value between 13 and 14 and can cause environmental damage if leaching, spilling, or wind erosion occurs.	Red mud is generally stored on site in ponds and is not hazardous, although it can pose environmental and human health concerns if it leaches out of the containment pond or releases dust from dried mud lakes. Potential uses for red mud are limited, though the following options have been explored with some success: recovering raw materials from red mud, using red mud as an input in cement production, or using red mud to naturally purify water. [434]
Sodium Hydroxide	Sodium Hydroxide, or caustic soda, is a main input into the Bayer process that is generally recycled through the process. In some cases, generally due to human error, caustic soda is spilled and released into the environment.	Proper handling and storage of sodium hydroxide in proper containers should allow the fluid to be fully recycled. [435]

[432] Department of Health and Human Services, Center for Disease Control and Prevention, *Dust Control Handbook for Industrial Minerals Mining and Processing* (Washington, DC: U.S. Government Printing Office, 2012).

[433] "Primary Metals – Chapter 4: Aluminum Smelting and Refining," Illinois Sustainable Technology Center, University of Illinois. Accessed November 5, 2015, at http://www.istc.illinois.edu/info/library_docs/manuals/primmetals/chapter4.htm.

[434] Dong-Yan Liu and Chuan-Weng Wu, "Stockpiling and Comprehensive Utilization of Red Mud Research Progress," *Materials* (2012), p. 1232-1246.

[435] F.E. Farghly, M. A. Barakat, and S. M. El-Sheikh, "Removing Al and Regenerating Caustic Soda from the Spent Washing Liquor of Al Etching," *Journal of Materials* 57:8 (2005), p. 34-38.

Potential releases from aluminum and bauxite refining using the Bayer process are regulated under the ELGs outlined by the CWA for the nonferrous metals manufacturing point-source category.[436] These requirements limit the volume of process wastewater overflow that may be discharged from impoundments. Runoff from surface impoundments may be regulated under stormwater permits.[437] Stormwater permits regulate stormwater contaminated by contact with material from mining activities.

State Regulations

State and local governments implement solid waste management guidelines under RCRA Subtitle D. Currently, facilities using the Bayer process and releasing red and brown muds operate in Texas and Louisiana, and are regulated under those states' solid waste regulations (Texas: Title 30 Texas Administrative Code Chapter 335; Louisiana: Title 33, Part VI). Both states mandate operating and closure standards for surface impoundments holding processing waste.

Non-Operating Sites and Currently Operating Facilities

Non-Operating Sites

None of the non-operating mining and processing CERCLA sites within the sample reviewed used Bayer processing. Additional research identified the St. Croix alumina facility, located on the St. Croix Island of the U.S. Virgin Islands, and the North Alcoa Site, located in East St. Louis, as non-operating Superfund sites that produced alumina using the Bayer process. At these sites, on-site disposal of red and brown muds led to contamination in the surrounding area:

- **St. Croix Alumina** (EPA ID VIN000206465): The St. Croix Alumina (SCA) site produced alumina from bauxite using the Bayer process.[438] The site, which began operations in 1962,[439] generated red mud from the Bayer process.[440] The caustic sludge contaminated land in the area surrounding the facility and seeped into the Alucroix Channel, which feeds into the Caribbean Sea.[441]

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436 40 CFR Part 421.

437 The classification of point and nonpoint discharges from mining operations has evolved over time. For more information regarding current definitions of point sources from mining operations, see: Greater Yellowstone Coalition v. Lewis, 628 F.3d 1143 (9th Cir. Dec 23, 2010)

438 "Former St. Croix Alumina (SCA) site in St. Croix VI," Integrated Solar and Wind Energy Powers Oil Recovery. Accessed November 13, 2015: https://frtr.gov/pdf/meetings/may10/presentations/gordon-presentation.pdf.

439 Daniel Shea, "EPA Begins Superfund Evaluation of Red Mud," *Virgin Islands Daily News* (June 9, 2011). Accessed November 13, 2015: http://virginislandsdailynews.com/news/epa-begins-superfund-evaluation-of-red-mud-1.1159506.

440 Fiona Stokes, "V.I. reaches $135M settlement with companies blamed for environmental damage on St. Croix's south shore," *Virgin Island Daily News* (June 14, 2014). Accessed November 18, 2015: http://virginislandsdailynews.com/news/v-i-reaches-135m-settlement-with-companies-blamed-for-environmental-damage-on-st-croix-s-south-shore-1.1702800.

441 Kery Murakami, "Lockheed Martin Denies Liability For Toxic Leak Damages," *Law 360* (May 12, 2015). Accessed November 13, 2015: http://www.law360.com/articles/654891/lockheed-martin-denies-liability-for-toxic-leak-damages.

In 2012, the Virgin Islands Department of Planning and Natural Resources (DPNR) reached a settlement with past owners and operators of the site.[442] According to the settlement, operators and owners of the site, as well as their successors, would be responsible for all past and future response costs related to releases of hazardous substances at the site, including bauxite residue.[443] It also required implementing a Maintenance/Monitoring/Inspection Plan.[444] Additionally, it required that the Upper Cooling Pond, in which bauxite residue is contained, be covered and restricted.[445] The site and its owners/operators have been involved in additional litigation since the 2012 settlement.

- **North Alcoa Site** (EPA ID IDILSFN0508010)[446]: Alcoa Inc. conducted alumina and aluminum fluoride refining at the North Alcoa site, which occupies 400 acres in East St. Louis, from 1903 to 1957.[447] During World War II, red mud from the site was mixed with limestone and soda ash in rotary kilns to create "brown mud." Both brown mud and red mud were disposed of at the site, initially in a place called Pittsburgh Lake and later at residue disposal areas (RDAs).

Bauxite was released from the dike of RDA 1.[448, 449] In 1997, Illinois EPA found elevated levels of lead, arsenic, cadmium, and cyanide in sediment and surface water samples at the site.[450] In

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442 Past owners and operators included St. Croix Alumina, LLC, Alcoa World Alumina LLC, St. Croix Renaissance Group, LLLP, and Lockheed Martin Corporation (the successor to Martin Marietta Alumina and Harvey Alumina).

443 District Court of the Virgin Islands, *Agreement and Consent Decree Regarding the Former Alumina Refinery Property, Anguilla Estate, St. Croix, U.S. Virgin Islands* (February 15, 2012). Accessed November 18, 2015: http://www.federal-litigation.com/SCRG-ConsentDecree.pdf.

444 District Court of the Virgin Islands, *Agreement and Consent Decree Regarding the Former Alumina Refinery Property, Anguilla Estate, St. Croix, U.S. Virgin Islands* (February 15, 2012). Accessed November 18, 2015: http://www.federal-litigation.com/SCRG-ConsentDecree.pdf.

445 District Court of the Virgin Islands, *Agreement and Consent Decree Regarding the Former Alumina Refinery Property, Anguilla Estate, St. Croix, U.S. Virgin Islands* (February 15, 2012). Accessed November 18, 2015: http://www.federal-litigation.com/SCRG-ConsentDecree.pdf.

446 "Region 5 Cleanup Sites, North Alcoa Site, Operable Unit 1," U.S. Environmental Protection Agency. Accessed November 17, 2015: http://www3.epa.gov/region5/cleanup/northalcoa.

447 "Operable Unit 1, North Alcoa (Alcoa Properties) Site, Saint Clair County, East St. Louis, Illinois," U.S. Environmental Protection Agency. Accessed November 18, 2015: http://www3.epa.gov/region5/cleanup/northalcoa/pdfs/na-rod-2012.pdf.

448 "Operable Unit 1, North Alcoa (Alcoa Properties) Site, Saint Clair County, East St. Louis, Illinois," U.S. Environmental Protection Agency. Accessed November 18, 2015: http://www3.epa.gov/region5/cleanup/northalcoa/pdfs/na-rod-2012.pdf.

449 This on-site release is believed to have occurred in the 1930s.

450 "Operable Unit 1, North Alcoa (Alcoa Properties) Site, Saint Clair County, East St. Louis, Illinois," U.S. Environmental Protection Agency. Accessed November 18, 2015: http://www3.epa.gov/region5/cleanup/northalcoa/pdfs/na-rod-2012.pdf.

1999, EPA found elevated levels of lead in the red mud ponds onsite.[451] Alcoa began reclamation of soil at the site in 2014.[452]

Currently Operating Facilities

Two of the currently operating facilities reviewed, Noranda Gramercy (MSHA ID 1600352) and Sherwin Alumina (MSHA ID 4100906), produce alumina and conduct Bayer processing. Evidence from publicly available sources revealed that spills of process chemicals (including sodium hydroxide) can be a concern at currently operating facilities:

- **Noranda Gramercy** (MSHA ID 1600352): Noranda Alumina LLC has operated the Gramercy, Louisiana facility since 2004.[453] The original operator, Kaiser Aluminum & Chemical Corporation, began in 1959.[454] The facility uses the Bayer process to chemically refine and convert bauxite into alumina, of which it produces 1.2 million metric tonnes per year. The facility has 32 releases recorded in ERNS. The releases, which took place between 1992 and 2011, included lead compounds, sulfuric acid, sodium hydroxide, hydrochloric acid, 2,4-dimethylphenyl, carbon disulfide, asbestos, and chlorine. The largest releases took place in 2000 and 2005, when 30,000 and 44,000 gallons of sodium hydroxide were released due to a pipe break and operator error, respectively. These releases were likely related to Bayer processing as sodium hydroxide is used in the Bayer process.

  The site contains red mud in sludge ponds, which cover approximately 920 acres.[455] These sealed ponds feature steep walls to provide stability.[456] Additionally, the ponds are dewatered to stabilize the red mud.[457]

- **Sherwin Aluminum** (MSHA ID 4100906): The Sherwin Alumina facility in Gregory, Texas has the capacity to produce 1.65 million tonnes of alumina from bauxite annually.[458] This facility has two reported releases in ERNS. These releases occurred in

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451 "Operable Unit 1, North Alcoa (Alcoa Properties) Site, Saint Clair County, East St. Louis, Illinois," U.S. Environmental Protection Agency. Accessed November 18, 2015: http://www3.epa.gov/region5/cleanup/northalcoa/pdfs/na-rod-2012.pdf.

452 "Region 5 Cleanup Sites, North Alcoa Site, Operable Unit 1," U.S. Environmental Protection Agency. Accessed November 17, 2015: http://www3.epa.gov/region5/cleanup/northalcoa.

453 "Mine Data Retrieval System," U.S. Department of Labor. Mine Safety and Health Administration (MSHA). Accessed November 11, 2015: http://arlweb.msha.gov/drs/drshome.htm.

454 "Alumina Refinery – Gramercy, Louisiana," Noranda. Accessed November 11, 2015: http://www.norandaaluminum.com/gramercy-alumina.php.

455 "DEQ Fact Sheet: Alumina Plant Facts," Louisiana Department of Environmental Quality. Accessed November 18, 2015: http://www.deq.louisiana.gov/portal/portals/0/news/pdf/Aluminaplantfacts.pdf.

456 "DEQ Fact Sheet: Alumina Plant Facts," Louisiana Department of Environmental Quality. Accessed November 18, 2015: http://www.deq.louisiana.gov/portal/portals/0/news/pdf/Aluminaplantfacts.pdf.

457 "DEQ Fact Sheet: Alumina Plant Facts," Louisiana Department of Environmental Quality. Accessed November 18, 2015: http://www.deq.louisiana.gov/portal/portals/0/news/pdf/Aluminaplantfacts.pdf.

458 "About Us," Sherwin Alumina Company, LLC. Accessed November 11, 2015: http://www.sherwinalumina.com/page.php?name=about-us.

2001 and 2007, and consisted of 15,013 and 2,783 pounds of sodium hydroxide released due to equipment failure. This site also received complaints about dust emitted from the red mud lagoons, which are used as a waste management method.[459] A Texas Department of State Health Services Health Consultation concluded that, although several metals exceeded health based screening values, the exposure of metal contaminants in the red mud dust does not pose a public health hazard.[460]

Because of the small sample size, it is difficult to determine the extent or trend of releases related to Bayer processing. Based on these cases, however, the primary concern at currently operating facilities appears to be releases of sodium hydroxide, which is extremely corrosive and can cause severe burns and permanent tissue damage as well as increases in the pH of surface water that it contaminates.[461] Additionally, proper waste management of red mud is essential for preventing contamination. Information about currently operating sites, however, does not consider future long-term waste management issues.

[459] Texas Department of State Health Services, *Letter Health Consultation: Evaluation of Air Quality, Leo Miller Road Site* (Washington, DC: U.S. Government Printing Office, 2009); accessed November 12, 2015, at: http://www.atsdr.cdc.gov/HAC/pha/LeoMillerRoadSite/LeoMillerRdLetterHC05-15-2009.pdf.

[460] Texas Department of State Health Services, *Letter Health Consultation: Evaluation of Air Quality, Leo Miller Road Site* (Washington, DC: U.S. Government Printing Office, 2009); accessed November 12, 2015, at: http://www.atsdr.cdc.gov/HAC/pha/LeoMillerRoadSite/LeoMillerRdLetterHC05-15-2009.pdf.

[461] "Hazardous Substance Fact Sheet: Sodium Hydroxide," New Jersey Department of Health. Accessed November 12, 2015, at http://nj.gov/health/eoh/rtkweb/documents/fs/1706.pdf.

Section 2: Waste Management Practices

A. Mine-Influenced Water

B. Waste Rock Management

C. Tailings Management

D. Leaks and Spills Resulting in Releases from Mining and Associated Processes

A. Mine-Influenced Water (MIW)

Background

MIW encompasses any water whose chemical composition has been affected by mining or mineral processing. The most prevalent type of MIW is AMD, but MIW also includes drainage that is neutral or alkaline. In addition to environmental concerns posed by acidity or alkalinity, MIW often contains elevated concentrations of mobilized contaminants, suspended solids, or sulfate or arsenate content.

There are many potential sources of MIW, as it includes any natural waters that come into contact with mining operations. Common sources include groundwater affected by pits or underground workings, surface water that has entered surface excavations, or any precipitation that comes into contact with pit faces, leach piles, waste rock piles, or tailings piles. MIW does not include purposeful discharges of mining or milling wastes into surface waters.[462]

Since the very beginning of mining history, MIW has been a source of both environmental and human health concerns. References to specific reactive sulfides and their degradation to acid were made as early as the Roman era, and by the mid-16th century, the harmful effects on water and soil were well known.[463] MIW can create long-lasting effects that far outlive the active lifespan of a mine. As a result, many non-operating sites continue to cause environmental damage even after centuries of inactivity. MIW remains one of the most significant issues across the mining industry; acid drainage affects thousands of miles of streams and rivers in the U.S., an estimate that does not consider its effects on groundwater.[464]

Potential Risks

Environmental issues resulting from MIW vary depending on commodity, climate, type of mine or processing facility, and mine phase. A key characteristic for most MIW (whether acidic, neutral, or alkaline drainage) is an elevated concentration of trace elements that have leached from surrounding solids such as waste rock, tailings, or mine surfaces. These contaminants, usually found in an insoluble sulfide phase, are released to solution through an oxidation reaction. In AMD, the drainage contains sulfidic minerals that react with oxygen and water to

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[462] R.L. Schmiermund and M.A. Drozd, "Acid mine drainage and other mining influenced waters (MIW)," in *Mining Environmental Handbook: Effects on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p.599-617.

[463] The International Network for Acid Prevention, Global Acid Rock Drainage Guide (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), Chapter 2.

[464] U.S. Environmental Protection Agency, Office of Compliance, *Sector Notebook Project: Profile of the Metal Mining Industry* (Washington, DC: U.S. Government Publishing Office, 1995).

release acid to the solution, lowering its pH.[465] AMD can also increase concentrations for other contaminants, as low-pH conditions further mobilize any contaminants in surrounding materials. The solution, now with elevated contaminant content and/or a low pH, poses risks to surrounding groundwater, surface water, air, soil, and sediments.

Multiple chemical, physical and biological factors control the rate at which these reactions occur, and thus the severity of MIW's effects. For example, waste rock with a fine grain size generally oxidizes much more rapidly because of its increased surface area, causing more metals or acid to be released to solution. Temperature, ambient pH, and microbial activity also have significant effects on the composition of mine waters. These factors affect the transport and resulting drainage of MIW. In hot and arid climates, for example, less water is generally available for transport, and discharges are thus less likely to travel to the receiving environment.[466] Geological factors also play a key role. Sulfidic minerals such as pyrite are acid-generating, thus increasing the potential for acid-mine drainage and mobilized contaminants; other minerals such as calcite and lime are acid-consuming and produce neutral or alkaline waters.[467] Media rock with high concentrations of zinc, copper, lead, cobalt, nickel, and iron are more likely to generate AMD.[468] Mitigation efforts must take these differences into account to counter the negative effects of MIW on each site.

Prevention and Mitigation Techniques

Efforts to prevent and control MIW were minimal until contemporary mining. Finding effective techniques for mitigation and prevention of MIW remains a challenge. In the past, mine operators did not often attempt to mitigate or prevent mine-influenced water. Even with the development of contemporary mining mitigation techniques, operators struggle to find effective strategies. Nearly all types of mining operations create MIW, and prevention and mitigation efforts must be tailored to the specific characteristics and quantities of drainage present at the site.

MIW prevention strategies follow three general courses of action: the reduction of exposed mine features (e.g., open pits, waste rock piles), the removal of acid-generating or otherwise harmful geochemical characteristics from mine waste, and the diversion of run-off away from mine features. The application of covers to waste rock piles and tailings storage facilities and the

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[465] R.L. Schmiermund and M.A. Drozd, "Acid mine drainage and other mining influenced waters (MIW)," in *Mining Environmental Handbook: Effects on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p.599-617.

[466] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), Chapter 2.

[467] Thomas Nash, *Overview of Mine Drainage Geochemistry at Historical Mines, Humboldt River Basin and Adjacent Mining Areas* USGS Bulletin 2210-E (Washington, DC: U.S. Government Printing Office, 2003). Accessed December 13, 2015, at http://pubs.usgs.gov/bul/b2210-e/B2210E508V6.pdf.

[468] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), Chapter 2.

practice of backfilling open pits or underground adits minimizes the ability of oxygen or water to pass through those features. Operators can segregate and selectively deposit solid waste – tailings or waste rock – with high concentrations of sulfidic material. Diversion channels and ditches prevent MIW by intercepting and conveying runoff before it reaches mining sites. Under proper geologic conditions, burying waste rock or using overburden material as backfill can also reduce acid generation substantially.[469] Even with the application of the above strategies, however, ongoing monitoring must be conducted to assess the efficacy of any prevention methods at a given mine site if they fail or prove insufficient.

The effects of MIW are often widespread and long-lasting. Most mines require ongoing management for acidic drainage, as it continues to be a problem even at sites that have been inactive for more than a century. Current mitigation methods for MIW take place before and after mine-water releases.[470]

Two general types of treatment methods exist when prevention is not sufficient: active and passive. Both types work to remove or reduce the concentration of contaminants in MIW, and usually require long-term funding and maintenance. Active treatments generally require ongoing human intervention, operation, and infrastructure, usually through the construction of a treatment plant. On the other hand, passive methods typically employ natural construction materials and involve the creation of a self-sustaining treatment system, such as wetland/ecosystem habitats.[471]

Both passive and active treatments use the same basic methods to mitigate the contaminants in MIW: aeration, chemical addition, and removal. For example, passive treatments achieve mitigation by constructing wetlands to facilitate aeration and to foster microbes that consume contaminants. Alternatively, they can build of a drain or bed that neutralizes pH levels in MIW before the MIW enters the local environment. Active methods involve capturing MIW and using treatment circuits to remove contaminants, such as ion exchange or chemical precipitation, or add counteracting chemicals to the MIW, as with alkaline addition for AMD.[472] A variety of treatment techniques are available, but each site is unique and the best mitigation techniques for any facility will vary depending on the commodity, scale, processing methods, climate, and site characteristics.

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[469] The International Network for Acid Prevention, Global Acid Rock Drainage Guide (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), Chapter 6.

[470] G. Hilson and B. Murck, "Progress toward pollution prevention and waste minimization in the North American gold mining industry," *Journal of Cleaner Production* 9 (2001), p. 405-415.

[471] The International Network for Acid Prevention, Global Acid Rock Drainage Guide (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), Chapter 7.

[472] The International Network for Acid Prevention, Global Acid Rock Drainage Guide (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), Chapter 7.

B. Waste Rock Management

Introduction

Waste rock is uneconomic material that abuts or surrounds commodity-bearing ore and is currently deemed not fit for processing. The commodity is separated from waste rock at the mine site, at which point the operator disposes of the waste rock. Disposal typically involves depositing the waste rock in dedicated dumps or piles,[473] or in some cases using it as mine backfill. Waste rock can also be co-disposed with paste or filtered tailings, or in a slurry pond.[474] Waste rock containing residual quantities of a commodity may later become economical because more efficient processes have been developed, allowing operators to treat the waste as ore using low-cost methods such as acid leaching or, depending on the mineralogy of the rock, milling. To this end, operators sometimes reserve waste rock that contains marginally economic grades of ore, either to mill when doing so is economical or to mix with high-grade ore to maintain the grade of feed to the mill.

Historically, operators often disposed of waste rock in the local environment without attempting to contain the waste (e.g., by depositing it in or near flowing surface water). In contrast, current operations are subject to a regulatory framework that addresses waste disposal before the start of mining and processing activity, sets performance and monitoring standards, and requires an approved reclamation plan. As a result, management practices have improved, but releases of hazardous substances continue. Further, releases from waste rock disposals can arise years after operations have ceased, through discharges of MIW, and pile deformation or collapse. Thus, waste rock disposals are often the focus of reclamation and closure plans and require consistent and long-term maintenance, monitoring, and potentially treatment.

Past and Current Use

In the past, miners deposited waste materials from mining operations in the most convenient available area without attempting to limit the waste materials' impact on the local environment. Over time, operators increasingly considered the environmental impact of waste rock dumping methods by developing dedicated dump and pile areas that featured topographical or constructed

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[473] This paper uses both "dump" and "pile" to reflect the fact that mine operators may dispose of waste rock by dumping it over the side of slope or by using conveyors to pile the rock on flat ground. Although the paper uses both terms for the sake of comprehensiveness, it does not consider differences between the two or specificities of one or the other regarding the technicalities of construction and maintenance or the potential for release.

[474] "Waste rock" is the most common term for the material extracted alongside a commodity and separated from the commodity at the mine site. Alternative terms include "production rock," "excess rock," and "barren rock." Sometimes, waste rock is grouped into the category of "overburden." Some operators reject the term waste rock because some states tax material defined as "waste" on a per tonnage basis. For the purposes of this paper, the term "waste rock" is used as it is defined above. This document will not use any other term to refer to what the document has defined as "waste rock" unless a specific non-operating site or current facility uses that term. For terms and reason for variations, see D.J.A. Van Zyl and J.N. Johnson, "Systems Design for Site Specific Environmental Protection, in *Mining Environmental Handbook: Effects on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p. 412.

barriers to contain waste rock. Miners also backfilled surface and underground mines with waste rock more frequently, which limited a site's topographical and environmental footprint. Over the past twenty years, particular progress has been made in understanding and minimizing the impact of MIW (including AMD),[475] an environmental hazard associated with waste rock piles and dumps.[476]

Because of rising metal prices and technological innovations that reduced the cost of extracting ore, the contemporary mining industry has moved towards larger operations that exploit economies of scale. Together, those trends have made the mining and processing of low-grade ore increasingly economical. Increased production and the extraction of low-grade ore have resulted in a concurrent increase in the amount of waste material produced at mines.[477] Thus, while contemporary operators are more cognizant of the impact waste rock deposition has on the environment and can better manage AMD, they are also producing greater volumes of waste rock.

Technical Description

Waste rock consists largely of coarse material – cobbles, rocks, and boulders – in addition to some fine particles.[478] Although waste rock encompasses material of many different sizes, typically most particles are greater than 20 centimeters in diameter. Because of that variation, waste rock stratifies itself by size when it is dumped down an incline, with the coarsest fraction landing at the bottom. Waste rock is also heterogeneous in terms of geochemical composition, mineralogy and hydrology, which cause significant environmental diversity within individual waste rock piles or dumps themselves.[479]

Underground and surface mining operations both produce waste rock, although surface mines yield a far greater proportion compared to the amount of ore extracted.[480] Ore and waste are extracted separately, and the waste rock is transported to the disposal site, which may be in a

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[475] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 1.2.

[476] U.S. Environmental Protection Agency, *Technical Report: Acid Mine Drainage Prediction* (Washington, DC: U.S. Government Printing Office, 1994), p. 3.

[477] U.S. Environmental Protection Agency, *Technical Report: Design and Evaluation of Tailings Dams* EPA530-R-94-038 (Washington, DC: U.S. Government Printing Office, 1994), p. 1. Accessed November 21, 2015, at: http://www3.epa.gov/epawaste/nonhaz/industrial/special/mining/techdocs/tailings.pdf; and National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[478] Marc Orman, Rich Peevers, and Kristin Sample, "Chapter 8.11: Waste Piles and Dumps," in *SME Mining Engineering Handbook*, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 1, p. 672.

[479] U.S. Environmental Protection Agency, *Technical Report: Acid Mine Drainage Prediction* (Washington, DC: U.S. Government Printing Office, 1994), p. 3.

[480] D.J.A. Van Zyl and J.N. Johnson, "Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p. 412.

previously mined pit or at a dedicated dump or pile. Once there, trucks end-dump the waste rock over the side of the dump lift. Alternatively, conveyors may be used to stack the waste rock on top of the pile.[481] Depending on the topography of the mine site, waste rock dump and pile sites vary in design and the degree to which the operator must amend the local topography.[482] In most cases, the unit will have stormwater runoff collection ponds to control sediment that the pile emits during precipitation, and surface runoff diversion ditches to prevent natural runoff from entering the waste rock storage unit.[483]

Both dumping and stacking create an angle of repose slope in the waste rock. Typically, the slope is about 35 to 40 degrees, or has a horizontal length to vertical height ratio of about 2:1 to 3:1.[484] The material is contained on the low-end of the pile or dump by a constructed toe to increase stability and limit seepage from the facility. Operators typically can install lifts and benches to minimize the height from which material falls when dumped, and grade the slope to ensure a proper angle and protect the exposed dump face from runoff.[485] Unlike tailings storage facilities or heap and dump leach pads, waste rock piles or dump sites are rarely lined, although reclamation plans sometimes call for post-closure coverage to mitigate the potential for weathering and subsequent dissolution of soluble materials.[486]

Potential Sources of Hazardous Substances

The risk for contamination from hazardous substances originating in waste rock depends on the mineralogy and geochemical composition of the waste rock and its level of exposure to air and water at the disposal site. For example, sulfide rock can generate acids that dissolve trace elements that, without long-term containment, collection, and treatment, pose a significant concern long after initial disposal. Discharges can take years to develop, and pose a long-term risk of hazardous releases at the site. Thus, operators must conduct mitigation efforts including

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[481] Dirk Van Zyl, "Mine waste disposal," in *Geotechnical Practice for Waste Disposal*, ed. D.E. Daniel (Medford, MA: Springer Science and Business Media, 2012), p. 271-272.

[482] Marc Orman, Rich Peevers, and Kristin Sample, "Chapter 8.11: Waste Piles and Dumps," in *SME Mining Engineering Handbook*, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 1, p. 668 and 672.

[483] Dirk Van Zyl, "Mine waste disposal," in *Geotechnical Practice for Waste Disposal*, ed. D.E. Daniel (Medford, MA: Springer Science and Business Media, 2012), p. 271.

[484] Marc Orman, Rich Peevers, and Kristin Sample, "Chapter 8.11: Waste Piles and Dumps," in *SME Mining Engineering Handbook*, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 1, p. 672 and 676.

[485] Dirk Van Zyl, "Mine waste disposal," in *Geotechnical Practice for Waste Disposal*, ed. D.E. Daniel (Medford, MA: Springer Science and Business Media, 2012), p. 272.

[486] See Marc Orman, Rich Peevers, and Kristin Sample, "Chapter 8.11: Waste Piles and Dumps," in *SME Mining Engineering Handbook*, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 1, p. 676-677.

maintenance, monitoring and – if the site is potentially acid generating - treatment.[487] To minimize the risk of waste rock piles or dumps causing environmental harm from deformation or collapse, dedicated visual and mechanical monitoring is often sufficient.[488]

State and Federal Regulations

Since 1980, federal and state governments have constructed a system of regulatory restrictions and permitting requirements to govern mine waste disposal that apply to waste rock piles and dumps.[489] At both the federal and state level, land management and environmental regulations address potential environmental risks from waste rock disposal and management.

Mining and processing operations may be subject to preliminary environmental planning and assessment, operational requirements and performance standards, and reclamation requirements.

Federal Regulations

Federal agencies have promulgated rules regarding tailings management. These include:

- **Solid waste.** RCRA Section 3001(b)(1) (the Bevill Amendment) exempts solid waste from extraction, including waste rock, from regulation as hazardous waste under RCRA Subtitle C. State and local governments implement solid waste management guidelines under RCRA Subtitle D. EPA's authority under Subtitle D is limited; its primary role is to promulgate sanitary landfill criteria to prevent adverse effects on health or the environment. As of 2013, EPA has not finalized any solid waste management requirements specifically applicable to the disposal of Bevill waste.[490]

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[487] D.J.A. Van Zyl and J.N. Johnson, "Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p. 451.

[488] D.J.A. Van Zyl and J.N. Johnson, "Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p. 463.

[489] Marc Orman, Rich Peevers, and Kristin Sample, "Chapter 8.11: Waste Piles and Dumps," in *SME Mining Engineering Handbook*, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 1, p. 667.

[490] L. Luther, "Background on and Implementation of the Bevill Bentsen Exclusions in the Resource Conservation and Recovery Act: EPA Authorities to Regulate 'Special Wastes,'" *Congressional Research Service* R43149 (Washington, DC: U.S. Government Printing Office, 2013).

Exhibit 2.B.1. Potential Releases Associated with Waste Rock

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
Deformation or Collapse	Waste rock piles can reach heights of up to five hundred meters. Those structures can fail for a variety of reasons, either due to significant precipitation, erosion, seismic activity, or fundamental structural instability. When failure occurs, waste rock escapes the bounds of the facility and any hazardous substances present in the waste rock can enter the local environment. Furthermore, even geochemically benign waste rock ejected from a waste rock pile as a result of sudden failure can cause significant physical harm to the local environment.[491]	Pre-operational planning and analysis to account for and avoid topographical and geological factors that could contribute to failure mitigates the possibility of release in the operational and post-closure phases.[492] Simple monitoring and visual inspection, if performed consistently and thoroughly, is essential to lessen the risk of deformation or collapse.[493] Additionally, an automated wireline extensometer can monitor the physical stability of a dump or pile remotely by recording the changes in tension of a line anchored in the waste rock.[494] Foundation pore water pressure analysis and foundation strains are more sophisticated mitigation methods.[495] The construction of dumps as a series of wrap-arounds so as to form a flat face minimizes the slope-related failure potential and facilitates reclamation.[496]

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[491] D.J.A. Van Zyl and J.N. Johnson, "Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p. 463.

[492] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.1 ("*GARD Guide*").

[493] D.J.A. Van Zyl and J.N. Johnson, "Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p. 463.

[494] D.J.A. Van Zyl and J.N. Johnson, "Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p. 452.

[495] D.J.A. Van Zyl and J.N. Johnson, "Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p. 463.

[496] D.J.A. Van Zyl and J.N. Johnson, "Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p. 462.

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
MIW/AMD	Rock drainage can occur with a wide variety of mineralogical, hydrological, and chemical factors in place, although there are multiple standard test procedures used to predict the character of waste rock.[497] MIW generally may contain residual process chemicals or mobilized contaminants, with high acidity further mobilizing potentially hazardous trace elements. AMD involves the oxidation of metal sulfide minerals, often in the host rock of metal mining commodities. Extraction exposes the rock to air and water thus increasing its acid-generating potential. Upon exposure, a number of factors determine the rate, severity, and mobility of acid generation: the kind of sulfide mineral present, amount of water exposure, amount of oxygen exposure, presence of ferric iron, bacteria to catalyze oxidation reaction, and generated heat.[498] The sizes of waste rocks in a pile or dump can vary, from fine particles to boulders. Although a part of a waste rock pile predominantly made up of large rocks has increased air flow and lower permeability, smaller particles generate more acid because more of their surface area is exposed to oxygen, which leads to increased oxidization of constituent sulfides.[499] AMD has a considerable lag time from the first deposition of waste material to the observation of acidic discharge, making it an ongoing and potentially perpetual source of hazardous contamination at a mine site.[500]	Pre-operational analysis of the acid generating potential of waste rock is essential to determine whether the operation is feasible or how to neutralize any acid produced.[501] Potentially acid-generating waste rock may be saturated during disposal, or co-disposed with tailings and/or overburden to neutralize acidity. Co-disposal restricts access to oxygen of potentially acid generating material. Co-disposal material may also be alkaline-generating, thereby neutralizing acid-generating potential of waste rock. Co-disposal may involve the dumping of reactive waste rock into a saturated tailings impoundment or introducing waste rock to tailings before they undergo the filtration process to become paste tailings, creating "paste rock."[502] Co-disposal can also involve the layering of potentially acid generating layers with neutralizing layers (or vice versa) to minimize the transportation of acidic or basic discharge.[503] Potentially acid or alkaline generating waste rock piles or dumps may also be encapsulated by non-acid generating or neutralizing materials to act as a physical and chemical barrier to prevent rock drainage. Consideration of the hydrology and topography of the dump or pile site is necessary for effective encapsulation.[504]

[497] U.S. Environmental Protection Agency, *Technical Report: Acid Mine Drainage Prediction* (Washington, DC: U.S. Government Printing Office, 1994), p. 1.

[498] U.S. Environmental Protection Agency, *Technical Report: Acid Mine Drainage Prediction* (Washington, DC: U.S. Government Printing Office, 1994), p. 4-6.

[499] D.J.A. Van Zyl and J.N. Johnson, "Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p. 451.

[500] U.S. Environmental Protection Agency, *Technical Report: Acid Mine Drainage Prediction* (Washington, DC: U.S. Government Printing Office, 1994), p. 2.

[501] U.S. Environmental Protection Agency, *Technical Report: Acid Mine Drainage Prediction* (Washington, DC: U.S. Government Printing Office, 1994), p. 9-10; The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 5.0.

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
Erosion	Many factors can contribute to the erosion of the waste rock dump site. Most commonly, erosion is caused by hydrological weathering from precipitation and runoff or the geochemical nature of the waste rock material itself. Erosion can result in sudden deformation and collapse and/or the release of hazardous material into the environment.[505]	The operator must characterize the erosion potential of waste rock material before the start of operations to determine the optimal manner of deposition. A concave pile design mimics the natural path of erosion and mitigates the impact of an erosive event. Material with low erosion potential can cap higher erosion potential material.[506] That cap can be applied continuously as the disposal is constructed. To prevent water from entering the waste rock disposal and contributing to erosion, an operator can dig ditches around the disposal to divert water.[507] Consistent slope and water monitoring are also necessary to prevent erosion, with the potential addition of water treatment depending on the chemical content of the water.[508]

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[502] International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.3.7.

[503] U.S. Environmental Protection Agency, *Technical Report: Acid Mine Drainage Prediction* (Washington, DC: U.S. Government Printing Office, 1994), p. 7.

[504] International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.3.5.

[505] Marc Orman, Rich Peevers, and Kristin Sample, "Chapter 8.11: Waste Piles and Dumps," in *SME Mining Engineering Handbook*, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 1, p. 675-676.

[506] Marc Orman, Rich Peevers, and Kristin Sample, "Chapter 8.11: Waste Piles and Dumps," in *SME Mining Engineering Handbook*, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 1, p. 675-676.

[507] Dirk Van Zyl, "Mine waste disposal," in *Geotechnical Practice for Waste Disposal*, ed. D.E. Daniel (Medford, MA: Springer Science and Business Media, 2012), p. 271.

[508] Marc Orman, Rich Peevers, and Kristin Sample, "Chapter 8.11: Waste Piles and Dumps," in *SME Mining Engineering Handbook*, ed. Peter Darling (Englewood, CO: Society for Mining, Metallurgy, and Exploration, Inc., 2011), Volume 1, p. 675-676.

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
Topographical Impacts	Waste rock piles can reach heights of up to five hundred meters, potentially altering the topography and landscape of the mine area significantly.[509]	At closure, backfilling open-pit mines, in-pit co-disposal of tailings and waste rock with dry or wet covers,[510] and revegetation of the mining area can lessen or minimize topographical impacts.[511]

[509] D.J.A. Van Zyl and J.N. Johnson, "Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p. 463.

[510] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.3.7.

[511] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.6.

Facilities sometimes dispose of Bevill-exempt wastes in the same waste management units as non-exempt hazardous wastes, however.[512] In situations where facilities combine tailings with other wastes that exhibit hazardous characteristics, the waste mixtures may fall under RCRA Subtitle C regulations.

- **Water.** To comply with water quality standards under the CWA, mine operators must obtain permits under NPDES for any discharge of pollutant from a point source to waters of the United States.[513] For many hardrock commodities, EPA has promulgated ELGs requiring technology-based controls and establishing specific water quality standards for mine drainage from waste rock dumps.[514] The CWA sets effluent limits based both on the use of the best practicable control technology and those possible with the use of available and economically achievable technologies. Title III also sets a separate set of standards for new facilities.[515] For discharges or pollutants not covered by the ELGs, EPA or the delegated state authority incorporates limits into permits on a site-specific basis. The NPDES program applies to both active and inactive mines, as well as abandoned mines where legally responsible owners or operators of point sources can be identified.

  Runoff from waste rock piles or dumps may be regulated under NPDES stormwater permits.[516] Stormwater permits regulate stormwater contaminated by contact with material from mining activities, primarily requiring site-specific pollution prevention planning and/or implementation of mitigation practices.[517] These include treatment requirements, operating procedures, practices to control runoff, and monitoring.

  While EPA issues and oversees point-source discharge permitting under Section 402 of the CWA, the USACE issues "dredge and fill" permits under Section 404 of the CWA. Under CWA Section 404, mining operations may need to obtain a permit from USACE

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[512] An EPA survey of 106 facilities in 1989 indicated that 20 facilities placed mixtures of Bevill-exempt and non-exempt wastes in the same waste management unit. See: U.S. Environmental Protection Agency, *Mineral Processing Facilities Placing Mixtures of Exempt and Non-Exempt Wastes in On-site Waste Management Units: Technical Background Document Supporting the Supplemental Proposed Rule Applying Phase IV Land Disposal Restrictions to Newly Identified Mineral Processing Wastes* (Washington, DC: U.S. Government Printing Office, 2013).

[513] Point sources are defined broadly; they include any discernable, confined, and discrete conveyance, such as a pipe, ditch, channel, tunnel, conduit, or container. "Waters of the United States" includes navigable waters, tributaries, interstate waters, intrastate waters used by interstate travelers, or for industrial purposes by industries engaged in interstate commerce. Generally, mining operations would fall under the Clean Water Act for process wastewater, mine drainage, and stormwater. 40 CFR 440 defines "mine drainage" as water drained, pumped, or siphoned from active mining areas, including rock dumps. See: U.S. Environmental Protection Agency Region 10, *EPA and Hardrock Mining: A Source Book for Industry in the Northwest and Alaska* (Washington, DC: U.S. Government Publishing Office, 2003).

[514] For example: 40 CFR 436 (mineral mining and processing); 40 CFR 440 (ore mining and dressing); 40 CFR Part 421 (nonferrous metals manufacturing).

[515] See 40 CFR 36 and 40 CFR 40.

[516] Seepage to groundwater is not considered a point source, and is not regulated under the Clean Water Act. The classification of point and nonpoint discharges from mining operations has evolved over time. For more information regarding current definitions of point sources from mining operations, see: *Greater Yellowstone Coalition v. Lewis*, 628 F.3d 1143 (9th Cir. Dec 23, 2010)

[517] Best management practices for stormwater permits are described at 40 CFR 122.2.

to address the discharge of dredged or fill materials into surface water, including wetlands. In areas with streams, wetlands or lakes, construction and ongoing modifications of waste rock piles or dumps can trigger this requirement. Some regulatory uncertainty exists regarding how mining overburden, slurry, and tailings are regulated under the CWA, because different definitions of fill material are used by EPA and USACE. Thus, Section 404 permits have been issued for mining operations outside of NPDES permitting requirements.[518]

Mining operations on public federal land are subject to additional regulation. The BLM Section 3809 rules require operators to supply operational and baseline environmental information to the BLM to analyze potential environmental impacts and prevent undue degradation. That information includes an assessment of the facility's potential to generate acid drainage or other leachate. If possible, operators must further identify and pre-treat any potentially acid-generating or otherwise deleterious material prior to generation. If not, operators must prevent the migration of deleterious drainage, including capture and treatment and other engineering designs for the waste rock depository. If a facility has significant potential for acid drainage, the BLM will inspect it four times per year.[519]

State Regulations

Many states have operational, technology, and performance-based standards for general mining waste management and disposal in state solid waste regulations, state groundwater pollution laws, dam safety programs, or state mining laws. Generally, state and local governments implement solid waste management guidelines under RCRA Subtitle D, establishing operating and closure requirements that apply to all types of industrial waste disposal units. States with delegated authority also implement CWA regulations, with state programs at least as stringent as federal regulations. Many state mining programs address mine drainage. For example:

- **Alaska's** land reclamation performance standards require that operators reclaim any mined areas that have the potential to generate acid.[520]
- **California's** water quality program classifies mine waste based on potential threat to water quality. Waste rock with elevated levels of potentially deleterious substances must be placed in an engineered containment facility, and monitoring must be conducted to properly distinguish between waste rock types that pose more or less environmental impact.[521]

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[518] C. Copeland, "Controversies over Redefining 'Fill Material' Under the Clean Water Act," *Congressional Research Service* RL31411 (Washington, DC: U.S. Government Printing Office, 2013).

[519] U.S. Department of the Interior, Bureau of Land Management, *Surface Management Handbook* H-3809-1 (Washington, DC: U.S. Government Printing Office, 2012), Section 5.3.2.

[520] AS 27.19.020; 11 AAC 97.200-240.

[521] California Code of Regulations, Title 27, Section 22480.

- **Tennessee's** Water Quality Standards deem unusable any groundwater areas in which AMD occurs.[522]

Many states, however, exclude waste rock that has not been chemically treated from certain environmental regulatory programs.

Non-Operating Sites and Currently Operating Facilities

Many of the sites reviewed below began operations before the promulgation of major environmental laws in 1980. Since then, however, mine sites have continued to experience releases from waste rock. Piles and dumps can reach hundreds of meters high and, without consistent monitoring, pose a significant risk of deformation or collapse. Waste rock itself may contain mineral contaminants inherent to the ore strata, may generate acid when constituent metal sulfide minerals are oxidized, or may discharge MIW bearing other hazardous material. In any of the above cases, erosion, seepage, and run-off from precipitation can discharge those contaminants into the local environment, and all remain viable release vectors at currently operating mine sites.

Additionally, exploitation of economies of scale has led to mining of lower grade ore in increasing quantities and frequency, which in turn generates larger volumes of waste rock as the operators work ore deposits of increasing size.[523] Current operators must manage the increased quantities of waste rock attendant to contemporary mining practices; an escalation in waste rock generation and rate of disposal has put stress on the structural integrity of existing pile and dump sites, leading to failure.[524]

Furthermore, there is often a significant lag time between the start of mine operations and waste rock deposition and the observation of AMD.[525] It may take at least five years for the oxidization of the acid-generating material and subsequent transportation into the local environment to begin.[526]

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[522] Tennessee Water Quality Standards, Rule 0400-40-02.

[523] U.S. Environmental Protection Agency, *Technical Report: Design and Evaluation of Tailings Dams* EPA530-R-94-038 (Washington, DC: U.S. Government Printing Office, 1994), p. 1; and National Academy of Sciences, Committee on Technologies for the Mining Industry, Committee on Earth Resources, and National Research Council, *Evolutionary and Revolutionary Technologies for the Mining Industry* (Washington, DC: National Academy of Sciences, 2002).

[524] D.J.A. Van Zyl and J.N. Johnson, "Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p. 444.

[525] U.S. Environmental Protection Agency, *Technical Report: Acid Mine Drainage Prediction* (Washington, DC: U.S. Government Printing Office, 1994), p. 2.

[526] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 8.3.4.

In the below sample, documents confirmed at least eighteen non-operating sites or currently operating facilities experienced waste rock-related releases after 1980, out of a total of 105 sites reviewed.[527] Of those eighteen sites or facilities, ten experienced waste rock-related releases as a result of contemporary operations.

This review of contemporary mines did not capture information characterizing the scope and efficacy of reclamation and closure practices. Improper and failed reclamation have been the basis for past CERCLA actions at hardrock mines, and remains a consideration for the environmental performance of currently operating mines.

Non-Operating Sites

Documents confirmed that 19 of the 29 non-operating mining and processing CERCLA sites sampled for this review generated waste rock.[528] Of those 19 sites, waste rock was responsible for releases at 13 of the sites. Activity at many of the sites extended back before the widespread adoption of waste rock disposal practices, such as acid-generation predictive analysis and slope stability monitoring. Releases at those non-operating sites continued into contemporary mining period, however, due to AMD and other seeps into the local environment. For example:

- The **Captain Jack Mill** (EPA ID COD981551427) is a Superfund site in Ward, Colorado, that incorporates the Big Five Mine, the White Raven Mine, and the Captain Jack Mill Works. Gold and silver mining activity at the site began in 1861 and continued intermittently through 1992. The EPA placed the site on the NPL in 2003 following the detection of antimony, arsenic, cadmium, copper, lead, manganese, thallium, and zinc in nearby Left Hand Creek. The primary source of contamination was AMD from the Big Five adit, which originated in the 19th century. The site includes a waste rock pile that contributed to drainage because it prevented water from flowing from the adit, facilitating

[527] The sample considered above includes phosphate mines and processing facilities. The process of extracting phosphate ore from its surrounding material produces a large amount of clay in Gulf Coast phosphate operations and rock in other regions of the United States. Phosphate rock mining wastes are included among the categories of exempt special wastes from RCRA Subtitle C regulations, the 1980 Solid Waste Disposal Act Amendments, and the EPA Report to Congress on Wastes from the Extraction and Beneficiation of Metallic Ores, Phosphate Rock, Asbestos, Overburden from Uranium Mining, and Oil Shale. See U.S. Environmental Protection Agency Region 10, *Record of Decision: Declaration, Decision Summary, and Responsiveness Summary for Eastern Michaud Flats Superfund Site* (Washington, DC: U.S. Government Printing Office, 1998). See 42 U.S.C. 6901–6992k, Sec. 3001(b)3)A)(i-iii); and U.S. Environmental Protection Agency, *Report to Congress: Wastes from the Extraction and Beneficiation of Metallic Ores, Phosphate Rock, Asbestos, Overburden from Uranium Mining, and Oil Shale* EPA530-SW-85-033 (Washington, DC: U.S. Government Printing Office, 1985).

[528] Silver Mountain Mine (EPA ID WAD980722789), Midnite Mine (EPA ID WAD980978753), Cyprus Tohono Mine (EPA ID AZD094524097), Pioneer Pit and Gardner's Point Placer Mine (EPA ID CAN000905978), California Gulch (EPA ID COD980717938), Captain Jack Mill (EPA ID COD981551427), Summitville Mine (EPA ID COD983778432), Bueno Mine and Mill Site (EPA ID CON00802129), Bunker Hill Mining Area and Metallurgical Complex (EPA ID IDD048340921), Upper Tenmile Creek Mining Area (EPA ID MTSFN7578012), United Nuclear Corp. (EPA ID NMD030443303), Cimarron Mining Corp. (EPA ID NMD980749378), Tar Creek (Ottawa County (EPA ID OKD980629844), Fremont National Forest/White King and Lucky (EPA ID OR7122307658), Brewer Gold Mine (EPA ID SCD987577913), Barite/Nevada Goldfields (EPA ID SCN000407714), Gilt Edge Mine (EPA ID SDD987673985), Nelson Tunnel/Commodore Waste Rock (EPA ID CON000802630), Blackbird Mine (EPA ID IDD980725832).

Note that, based on a review of mining practices, it is likely that most, if not all, 35 non-operating sites reviewed generated waste rock. Documentation specifically described waste rock disposal at 19 sites, however.

the acid-generating process. Additionally, the EPA identified the site's waste rock piles themselves as sources of contamination, affecting both local groundwater and soil.[529]

In addition, at five of the non-operating mining and processing CERCLA sites sampled, waste rock disposal that occurred after 1980 was responsible for releases.

- Gold was discovered at the **Summitville Mine** (EPA ID COD983778432) site in Rio Grande County, Colorado, in 1870; surface mining began in 1875. Surface and underground mining began in earnest in 1925 and continued on an intermittent basis through 1991. Operators removed waste rock along with ore from the underground mine and deposited it at the adit entrances; the practice continued from the start of mining operations through the 1980s. Numerous operations created sulfuric acid and sulfates, and subsequent AMD which loaded metal concentrates and acidic water into the local environment. One waste deposition area, the Cropsy Waste Pile, incorporated low grade ore, overburden, and waste rock, covered 35 acres of land, and rose as high as 56.41 meters. Nearby operation of a heap leach pad caused the waste pile to flood and created five million gallons of "highly contaminated water." The EPA also identified the North Pit Waste Dump, containing overburden and waste rock, as a source of AMD.[530]
- The **Brewer Gold Mine** (EPA ID SCD987577913) is a non-operating open-pit gold mine in Jefferson, South Carolina. Mineral extractive activity may have occurred at the area as early as the 1500s and gold was discovered at the site in 1828. Contemporary mining operations did not begin until 1987, though, and ended in 1995. Waste rock was either used for facility construction or hauled to a disposal area. The ore was processed using cyanide heap leach methods. When mining activity ceased, the operator backfilled the pits with leached ore and waste rock. Metals and acid still present in the former waste rock dump area seep to a sediment pond, without which the seep would enter a local creek. The waste rock itself, now in the pit, is a source of groundwater leaching.[531]
- Located in McCormick, South Carolina, the **Barite/Nevada Goldfields** (EPA ID SCN000407714) site encompasses the Barite Hill gold and silver surface mine, operated by Nevada Goldfields, Inc. from 1989 until 1994. The site was referred to EPA in 2006. The ore was processed at a heap leach facility. Operations produced 250,000 cubic yards of acid generating pyritic waste rock, leading to AMD. The runoff and erosion flows to an acid collecting pit lake with a pH of 2, now in danger of overflow or failure. If the

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[529] U.S. EPA Region 8, *Captain Jack Superfund Site Record of Decision* (Washington, DC: U.S. Government Printing Office, 2008).

[530] U.S. Environmental Protection Agency, *Superfund Record of Decision: Summitville Mine, EPA ID: COD983778432, OU 00*, Rio Grande County, CO (Washington, DC: U.S. Government Printing Office, 1994).

[531] "NPL Site Narrative: Brewer Gold Mine," U.S. Environmental Protection Agency. Accessed November 25, 2011, at: http://www.epa.gov/superfund/sites/npl/nar1725.htm; and U.S. Environmental Protection Agency Region 4, *Interim Record of Decision, Summary of Remedial Alternative Selection, Brewer Gold Mine, Jefferson, Chesterfield County, South Carolina* (Washington, DC: U.S. Government Printing Office, 2005).

structural integrity of the lake were compromised, it would result in a catastrophic release of acidic metals laden water into adjacent surface water. EPA added the site to the NPL in April, 2009.[532]

- The **Nelson Tunnel/Commodore Waste Rock** (EPA ID CON000802630) is an underground mine site located near Creede, Colorado. The site was primarily a silver mine, but operators also extracted gold, copper, lead and zinc. It was active from 1876 through 1989. EPA added the site to the NPL in 2008. An adit at the site empties directly into nearby surface water and is a source of acidic metal laden water. In 2005, a less-than-20-year flood event caused a catastrophic failure of the 200,000 cubic yard waste rock pile, which partially collapsed and released arsenic, cadmium, lead, and zinc into the local environment; specifically, the pile fell into nearby surface water.[533]
- The **Blackbird Mine** (EPA ID D980725832) cobalt mine is located near Salmon, Idaho. An underground and surface operation, it was active from 1883 through 1982. Over the course of its life, the mine generated 4.8 million tons of waste rock in numerous depositions. AMD from the piles, as well as the underground workings, tailings impoundment, and direct-discharged tailings have distributed arsenic, cobalt, and copper into local surface water.[534]

Currently Operating Facilities

Documents confirmed that 21 of the 70 currently operating facilities sampled for this review generate waste rock.[535] Of those 21 facilities, waste rock was responsible for releases at five of them. Operations at many of the facilities started before the passage of contemporary

[532] "NPL Site Narrative: Barite Hill/Nevada Goldfields," U.S. Environmental Protection Agency. Accessed November 25, 2011, at: http://www.epa.gov/superfund/sites/npl/nar1784.htm; and U.S. Environmental Protection Agency, Region 4, "Action Memorandum to Franklin E. Hill, Director of the Superfund Division, re: Barite Hill Mine Site" (18 September 2007).

[533] "Superfund Site Description: Nelson Tunnel/Commodore Waste Rock," U.S. Environmental Protection Agency. Accessed January 6, 2012, at: https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0802630; and U.S. Environmental Protection Agency, Region 8, *Remedial Investigation: Nelson Tunnel/Commodore Waste Rock Pile* (Washington, DC: U.S. Government Printing Office, 2011).

[534] U.S. Environmental Protection Agency Region 10, Office of Environmental Cleanup, *Blackbird Mine Superfund Site Record of Decision* (Washington, DC: U.S. Government Printing Office, 2003).

[535] ArcelorMittal Minorca (MSHA ID 2102449), Asarco Silver Bell (MSHA ID 0200134), CML Iron Mountain (MSHA IDs 4201927 and 4202624), Coeur Kensington (MSHA ID 5001544), Coeur Rochester (MSHA ID 2601941), Florida Canyon Mine (MSHA ID 2601947), Freeport McMoRan Henderson (MSHA ID 0500790), Freeport McMoRan Morenci (MSHA ID 2000024), Freeport McMoRan Tyone (MSHA ID 2900159), Hecla Greens Creek (MSHA ID 5001267), Geo Nevada Spring Valley (MSHA ID 2602470), Halliburton Rossi (MSHA ID 2602239), Kinross Crown Resources Buckhorn Mine (MSHA ID 4503615), Rio Tinto Kennecott Bingham Canyon (MSHA IDs 4200149 and 4201996), Robinson Nevada (MSHA ID 2601916), Sixteen to One Mine (MSHA ID 401299), Mosaic South Pasture Hardee (MSHA ID 0800903), US Silver Galena (MSHA ID 1000082), Veris Gold – Jerritt Canyon (MSHA IDs 2602742 and 2601621), Monsanto/P4 South Rasmussen-Blackfoot Bridge (MSHA ID 1001854).

Note that it is likely, based on a review of mining practices respective to waste rock, that most if not all of the current sites that have active mines reviewed above generated waste rock. We were only able to find documentation of waste rock at the above 21 sites, however. Note, too, that Cyprus Tohono was part of both the non-operating site sample and the currently operating facility sample.

environmental legislation and the adoption of currently used waste rock disposal practices. At all five of the facilities that experienced waste rock-related releases, however, the releases occurred were the result of practices currently in use.

- **ArcelorMittal Minorca** (MSHA ID 2102449) is an iron mining and processing facility located in Virginia, Minnesota. Mining at the site began in 1974 and an iron pellet processor was constructed at the site in 1977. Mittal Steel USA began operating the site in 2007. Mittal codisposes and slurries waste rock low in iron with tailings, and pumps the mixture to a storage basin three miles from the mine. Three failures in the tailings and waste rock pipe occurred in 2013 and 2014, discharging 8,500 cubic yards of tailings and waste rock and affecting 15.3 acres of wetlands, potentially destroying the area's ability to function as a natural aquatic habitat and filtration system. It is unclear when the tailings and waste rock pipe and impoundment were installed.[536]
- The **Rio Tinto Kennecott Bingham Canyon** site (MSHA IDs 40122149 and 42011996) is an open-pit copper, gold, silver, and molybdenum mine located near Salt Lake City, Utah. Open-pit activity at the site started in 1906. Kennecott Copper Company, now a subsidiary of Rio Tinto, has operated the site since 1936. As part of its operations, Kennecott deposited waste rock on the slopes of the nearby Oquirrh Mountains. The waste rock dumps leached metals-rich acidic water first through an unlined reservoir and then into a groundwater plume that extended 72 square miles. The State of Utah took legal action against Kennecott as a result of the contamination in 1986; as a result of a consent decree reached in 2007, Kennecott (by then a subsidiary of Rio Tinto) agreed to treat the contaminated groundwater for the next forty years.[537]
- The **Veris Gold Jerritt Canyon Site** (MSHA IDs 2602742 and 2601621) is a gold mine located in Elko County, Nevada, first operated in 1980 and now operated by Queenstake Resources USA, Inc., a wholly owned subsidiary of Yukon-Nevada Gold Corporation. The site includes twelve closed surface mines (four reclaimed) and five underground mines. The mine has four rock disposal areas, constructed in the early 1980s, designed to minimize erosion by draining precipitation runoff toward the interior of the disposal. This design resulted in seepages from the toe of the disposals, however, with excessive amounts of total dissolved solids (primarily sulfates and magnesium). The seepages were

[536] "Pipeline, Storage Basin Failures Send Ore Tailings and Road Aggregate into Wetlands," Minnesota Pollution Control Agency, last updated 24 June 2015, accessed 10 December 2015 at: http://www.pca.state.mn.us/index.php/about-mpca/mpca-news/current-news-releases/pipeline-storage-basin-failures-send-ore-tailings-and-road-aggregate-into-wetlands-2-enforcement-actions-result.html; and "ArcelorMittal Pays Fines, Cleans Up," *Hibbings Daily Tribune* (26 June 2015).

[537] "Earthworks Factsheet: Problems with Bingham Canyon Mine," Earthworks, published 2011. Accessed December 29, 2015, at https://www.earthworksaction.org/files/publications/FS_Problems_BinghamCanyon_2011_low.pdf; and U.S. Environmental Protection Agency Region 8 and Utah Department of Environmental Quality, *Five-Year Review Report: Kennecott North Zone Superfund Site, Salt Lake County and Tooeele County, Utah* (Washington, DC: U.S. Government Printing Office, 2014).

detected in the late 1990s.[538]

- Operations at the **Monsanto/P4 South Rasmussen-Blackfoot Bridge** (MSHA ID 1001854) site, located near Soda Springs, ID, started in 1998. The site is currently operated by P4 Production LLC, a subsidiary of Monsanto. Operations include a surface mine and phosphate processing facility. In 2011, P4 Production reached a consent decree as a result of CWA violations resulting from seepages at the mine site. P4 Production deposited overburden and waste rock from the mine site at the Horseshoe Overburden Area, which discharged effluent containing selenium, cadmium, nickel, and zinc into local surface water because of rain and weathering.[539]
- The **ASARCO Silver Bell** (MSHA ID 0200134) site is a complex of four surface copper mines with a combination heap leach and solvent extraction/electrowinning processing operation located in Pima County, Arizona. Commercial mining and smelting at the site began in 1880. The site was not in operation between 1984 and 1997, at which point the solvent extraction/electrowinning circuit was installed. During a 1993 inspection in advance of the facility reopening in 1997, the ADEQ discovered that three surface streams passed near or underneath waste rock dumps contaminated with leach solution.[540]

[538] Queenstake Resources USA, Inc., *2009 Annual Work Plan: Jerritt Canyon Mine* (April 2009); and Nevada Division of Environmental Protection, "Fact Sheet: Water Pollution Control Permit NEV 0000020 (Renewal 2015, Rev. 00)" (2015).

[539] "For Immediate Release: Idaho Mining Company Agrees to Pay $1.4 Million Penalty to Settle Alleged Clean Water Act Violations," U.S. Department of Justice, Environmental and Natural Resource Division, Office of Public Affairs, released 20 April 2011. Accessed December 29, 2015, at: http://www.justice.gov/opa/pr/idaho-mining-company-agrees-pay-14-million-penalty-settle-alleged-clean-water-act-violations.

[540] U.S. Environmental Protection Agency, Office of Solid Waste, *Damage Cases and Environmental Releases from Mines and Mineral Processing Sites* (Washington, DC: U.S. Government Printing Office, 1997).

C. Tailings Management

Introduction

Tailings are the waste material created when valuable minerals or metals have been physically or chemically separated from ore. All beneficiation procedures generate tailings, in addition to mineral processing activities. Tailings usually take the form of a slurry (e.g., wet tailings), but may also undergo dewatering and disposal as paste or filtered tailings. Depending on the commodity and the beneficiation process, tailings may contain a variety of hazardous materials, both originating from geologic components of the ore or chemicals introduced during processing, and therefore require proper disposal and storage. Environmental concerns arise from the possibility of releases during the transportation of tailings from processing facility to a storage or disposal facility, and from the storage or disposal facility itself, both during operations and after facility closure.[541]

Past operations often disposed of tailings directly into local environments without any effort to contain them. Current operations are subject to a regulatory framework that addresses waste disposal before the start of mining and processing activity, sets performance standards, and requires an approved reclamation plan. As a result, management practices have improved, but releases continue. Many currently operating facilities and recently closed sites have operated for over a century, so it is unclear if releases occur from newly constructed impoundments designed using best management practices to prevent releases or from previous impoundments constructed before practices changed. Additionally, even after site closure, tailings remain a potential source of contamination. They are often a focus of reclamation and closure plans and require the application of a post-closure cover and continued maintenance and monitoring.

Past and Current Use

Until the middle of the 20th century, cost-effectiveness and convenience were the overriding determinants in tailing deposition practices, with tailings discharged into local waterways or drainages.[542] Early tailing impoundments, dating from the 19th and early 20th century, allowed operators to recycle water and chemicals used in processing and limited effects of tailings

[541] In this discussion, "tailings storage facility" means any location where tailings are stored (including uncontained piles). The use of the term "impoundment" means structural containment. A tailings "pond" is specifically a deposition site for slurry tailings (tailings transported to the storage site in liquid form).

[542] U.S. Environmental Protection Agency, *Technical Report: Design and Evaluation of Tailings Dams* EPA530-R-94-038 (Washington, DC: U.S. Government Printing Office, 1994).

disposal on local agriculture.[543] Operators deposited tailings in slurry form in unlined embankments or ponds constructed of local material.[544]

Although the practice of constructing tailings pond impoundments from local soil was commonplace by the 1970s, a combination of widely-publicized impoundment failures,[545] public concern over hazardous cyanide and uranium tailings,[546] and increased environmental regulation encouraged the development of more secure and stable tailings impoundment systems. Impoundment design changed in part because technology and engineering advanced, allowing for increased data collection and detection and computer modeling of embankments.[547] The specific evolution of tailings management since 1980 has proceeded down two tracks: lining tailings ponds with synthetic materials and decreasing the permeability of the tailings themselves.[548]

The use of synthetic films as liners in the mining industry began in the 1940s. The practice grew in popularity with the use of PVC at heap leach facilities in the 1970s, and the use of high density polyethylene (HDPE) for heap leach pads and tailings impoundments in the 1980s.[549] Synthetic liners have been increasingly common since then. An operator can also decrease the permeability of a tailings impoundment through the use of clay-amended soil liners or bentonite-amended clay liners, sometimes in conjunction with a synthetic liner.[550]

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[543] See Jon Engels, "History of Tailings Storage Methods," Tailings.info, website developed as part of PhD Dissertation "An Expert Management System for Surface Tailings Storage," submitted to the University of Leeds (2006). Accessed November 20, 2015, at: http://www.tailings.info/basics/history.htm.

[544] D.J.A. Van Zyl and J.N. Johnson, eds., "Chapter 8: Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p.423.

[545] D.J.A. Van Zyl and J.N. Johnson, eds., "Chapter 8: Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p. 412.

[546] D.J.A. Van Zyl and J.N. Johnson, eds., "Chapter 8: Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p. 436.

[547] Jack Caldwell and Dirk Van Zyl, "Thirty Years of Tailings History from Tailings & Mine Waste," Paper Presented at Tailings and Mine Waste 2011 (Vancouver: 6-9 November 2011).

[548] Jack Caldwell and Dirk Van Zyl, "Thirty Years of Tailings History from Tailings & Mine Waste," Paper Presented at Tailings and Mine Waste 2011 (Vancouver: 6-9 November 2011); and D.J.A. Van Zyl and J.N. Johnson, eds., "Chapter 8: Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p. 426.

[549] D.J.A. Van Zyl and J.N. Johnson, eds., "Chapter 8: Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p. 426.

[550] D.J.A. Van Zyl and J.N. Johnson, eds., "Chapter 8: Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p. 424-425; and Chris Athanassopoulos, Alyssa Kohlman, Michael Henderson, and Joseph Kaul, "Evaluation of Geomembrane Puncture Potential and Hydraulic Performance in Mining Applications," paper presented at Tailings and Mine Waste 2008 (Vail, CO: 19-22 October 2008).

Since 1973, operators have explored the possibility of thickening tailings to various levels of solidity: thick but still a slurry, paste (no flow velocity), or dry stacked.[551] Although the processes listed increase costs, they reduce the permeability of the tailings and are now a "standard method of tailings disposal." [552]

Technical Description

Tailings are the fraction of ore that remains after valuable minerals or metals have been removed. Typically, because crushing and grinding of the ore are precursors to most physical and chemical extraction processes, tailings are clay, silt, or sand-sized particles. When the desired mineral or metal has been removed through extraction and beneficiation, wet tailings are discharged in a dilute slurry at a 20-45 percent solids ratio, or can be physically treated to slurry at a solids ratio of 55 to 60 percent and conveyed through a pipeline to an impoundment facility.[553] Because of the liquid state of the tailings, ponds are the most commonly used repository. Ponds can be constructed or formed from the topography adjacent to the mill site from tailings or waste rock materials, and are bounded by low-permeability embankments or dams. On the other hand, water may be removed from the tailings altogether, creating solid paste (e.g., dry)[554] tailings which are then stacked in a tailings storage facility.[555] Operators may also dispose of tailings by leaving waste-in-place in tailings storage facilities, backfilling abandoned mines, or, in some cases, disposal may occur through various forms of subaqueous disposal. [556, 557]

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[551] Jon Engels, "Deposition Methods of Tailings," Tailings.info, website developed as part of PhD Dissertation "An Expert Management System for Surface Tailings Storage," submitted to the University of Leeds (2006). Accessed November 19, 2015, at http://www.tailings.info/disposal/deposition.htm.

[552] Jack Caldwell and Dirk Van Zyl, "Thirty Years of Tailings History from Tailings & Mine Waste," Paper Presented at Tailings and Mine Waste 2011 (Vancouver: 6-9 November 2011).

[553] D.J.A. Van Zyl and J.N. Johnson, eds., "Chapter 8: Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p. 428 and 431.

[554] D.J.A. Van Zyl and J.N. Johnson, eds., "Chapter 8: Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p. 431-432.

[555] D.J.A. Van Zyl and J.N. Johnson, eds., "Chapter 8: Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p. 443.

[556] Jon Engels, "Storage Techniques – In-Pit" and "Storage Techniques – Backfill of Tailings to Underground Workings," Tailings.info, website developed as part of PhD Dissertation "An Expert Management System for Surface Tailings Storage," submitted to the University of Leeds (2006), accessed November 20, 2015, at: http://www.tailings.info/storage/inpit.htm and http://www.tailings.info/storage/backfill.htm.

[557] Jon Engels, "Storage Techniques – Offshore Disposal," Tailings.info, website developed as part of PhD Dissertation "An Expert Management System for Surface Tailings Storage," submitted to the University of Leeds (2006), accessed November 20, 2015, at: http://www.tailings.info/storage/offshore.htm. Note that offshore marine discharge is illegal in the United States, but tailings can be disposed of in an existing pond in conjunction with the construction of some form of impoundment, or a pond may be constructed on top of impounded tailings. See also D.J.A. Van Zyl and J.N. Johnson, eds., "Chapter 8: Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p. 438.

The tailings slurry contains water, waste particles, and uneconomic portions of the commodity and other trace elements of potential environmental concern. At a later date, with more sophisticated and cost-efficient extraction processes or increased commodity prices, tailings may be subject to reprocessing as previously uneconomic grades of ore become economically viable.[558] Additionally, depending on the commodity and the processing method, tailings may contain chemical residues inherent to processing. For example, milling operations that practice flotation or leaching may produce tailings containing reagents such as lime or glycol ether and lixiviants including acids and cyanide.[559]

Of the hundreds of active hardrock mining and mineral processing facilities[560] in the United States, many have at least one and often several tailings storage facilities.[561] In most mining sectors, the ore mined consists largely of waste material, which create tailings. In cases where the commodity is rare but valuable, such as gold, processing generates tons of tailings for every fraction of an ounce of commodity produced. For commodities such as copper, advanced extraction technologies and economies of scale have made the mining of low-grade ore (which contains large proportions of waste material) cost-effective.[562] Thus, the volume of tailings that mine and mill operators need to dispose of has increased over time. Further, tailings have a long containment horizon because they stay in place after a mine ceases its activity – experts evaluate their monitoring needs in terms of at least 200 years – and therefore planning is required for their long-term stability and maintenance.[563]

The subsections below discuss two considerations for operators disposing of and managing tailings: the appropriate storage facility for the tailings and storage facility liner systems.

- **Tailings Storage Facilities** are the ultimate repositories for both slurry and paste tailings, unless the operator uses the tailings as mine backfill. Dewatered paste and filtered tailings are often deposited in a lined or unlined surface impoundment with a drain and an

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[558] Monica O. Mendez and Raina M. Meier, "Phytostabilization of Mine Tailings in Arid and Semiarid Environments – An Emerging Remediation Technology," *Environmental Health Perspectives* 116:3 (March 2008), p. 279.

[559] D.J.A. Van Zyl and J.N. Johnson, eds., "Chapter 8: Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p. 429.

[560] For "hundreds of active hardrock" facilities, see United States Department of Labor, Mine Safety and Health administration, Mine Data Retrieval System; accessed December 7, 2015, at: http://www.msha.gov/drs/drshome.htm. For the purposes of this paper, phosphate mining and primary processing and uranium mining and primary processing are included under the definition of "hardrock mining."

[561] U.S. Environmental Protection Agency, *Technical Report: Design and Evaluation of Tailings Dams* EPA530-R-94-038 (Washington, DC: U.S. Government Printing Office, 1994), p. 1.

[562] U.S. Environmental Protection Agency, *Technical Report: Design and Evaluation of Tailings Dams* EPA530-R-94-038 (Washington, DC: U.S. Government Printing Office, 1994), p. 1; and National Academy of Sciences, National Research Council, Committee on Technologies for the Mining Industry, Committee on Earth Resources. 2002. Evolutionary and Revolutionary Technologies for Mining.

[563] Jack Caldwell and Dirk Van Zyl, "Thirty Years of Tailings History from Tailings & Mine Waste," Paper Presented at Tailings and Mine Waste 2011 (Vancouver: 6-9 November 2011).

embankment.[564] To complete reclamation, dry tailings are capped with topsoil which may be planted to facilitate stabilization.[565]

Slurry impoundments feature embankments constructed from local soil, waste rock, or tailings themselves, in conjunction with the natural topography surrounding the facility.[566]

- **Liner systems**, now widely used in tailings impoundments (particularly for uranium or cyanide tailings), are multilayer structures designed to reduce the permeability of a containment structure to prevent seepage.[567] A typical liner may combine low permeability natural material such as clay, geosynthetic or synthetic geomembranes, and drainage layers and sumps with seepage detection systems, as well as covers to protect the layers from the elements.[568]

  Liners come in a variety of materials. Geosynthetic liners involve the amendment of soil or clay with low permeability material. Geomembranes are usually constructed from PVC or polyethylenes.[569] Even with advancements in synthetic or amended liners, when calculating permeability of liner systems it is assumed there is one hole per acre of liner.[570]

Potential Sources of Hazardous Substances

Tailings contain waste material (including uneconomical amounts of the commodity) and residue of the extractive chemicals. The specific hazardous substances they contain depend on the commodity, the geochemistry of the commodity-bearing ore, and the process. Additionally,

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564 Jack Caldwell and Dirk Van Zyl, "Thirty Years of Tailings History from Tailings & Mine Waste," Paper Presented at Tailings and Mine Waste 2011 (Vancouver: 6-9 November 2011).

565 Monica O. Mendez and Raina M. Meier, "Phytostabilization of Mine Tailings in Arid and Semiarid Environments – An Emerging Remediation Technology," *Environmental Health Perspectives* 116:3 (March 2008), p. 279.

566 U.S. Environmental Protection Agency, *Technical Report: Design and Evaluation of Tailings Dams* EPA530-R-94-038 (Washington, DC: U.S. Government Printing Office, 1994), p. 7-10; and D.J.A. Van Zyl and J.N. Johnson, eds., "Chapter 8: Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p. 434-435.

567 D.J.A. Van Zyl and J.N. Johnson, eds., "Chapter 8: Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p. 426 and 436.

568 Chris Athanassopoulos, Alyssa Kohlman, Michael Henderson, and Joseph Kaul, "Evaluation of Geomembrane Puncture Potential and Hydraulic Performance in Mining Applications," paper presented at Tailings and Mine Waste 2008 (Vail, CO: 19-22 October 2008).

569 D.J.A. Van Zyl and J.N. Johnson, eds., "Chapter 8: Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p. 426-427.

570 D.J.A. Van Zyl and J.N. Johnson, eds., "Chapter 8: Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p. 428.

tailings can contain trace elements that are mobilized by processing and through AMD or alkaline leaching. These naturally co-occurring substances (e.g., arsenic and mercury from gold ore) are liberated from rock and can present health and environmental concerns.

The releases described below pertain to tailings and tailings storage facilities while a mine or processing facility is operational, although tailings management remains relevant long after the mine and processing facility have closed. It is recommended that tailings containment strategies be evaluated at horizons of at least 200 years.[571] Reclamation plans and continued maintenance and monitoring are necessary to prevent or mitigate post-closure releases.

State and Federal Regulations

Current operations are subject to substantially more comprehensive regulatory requirements relative to past operations, where discharges and abandonment were common.[572] At both the federal and state level, land management and environmental regulations address potential environmental risks from tailings disposal and management.

Mining and processing operations may be subject to preliminary environmental planning and assessment, operational requirements and performance standards, and reclamation requirements.

Federal Regulations

Federal agencies have promulgated rules regarding tailings management. These include:

- **Solid waste.** RCRA Section 3001(b)(1) (the Bevill Amendment) exempts solid waste from extraction and beneficiation and 20 processing wastes from regulation as hazardous waste under RCRA Subtitle C. State and local governments implement solid waste management guidelines under RCRA Subtitle D. EPA's authority under Subtitle D is limited; its primary role is to promulgate sanitary landfill criteria to prevent adverse effects on health or the environment. As of 2013, EPA has not finalized any solid waste management requirements specifically applicable to the disposal of Bevill waste.[573]

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[571] Jack Caldwell and Dirk Van Zyl, "Thirty Years of Tailings History from Tailings & Mine Waste," Paper Presented at Tailings and Mine Waste 2011 (Vancouver: 6-9 November 2011).

[572] U.S. Environmental Protection Agency, *Technical Report: Design and Evaluation of Tailings Dams* EPA530-R-94-038 (Washington, DC: U.S. Government Printing Office, 1994).

[573] L. Luther, "Background on and Implementation of the Bevill Bentsen Exclusions in the Resource Conservation and Recovery Act: EPA Authorities to Regulate 'Special Wastes,'" *Congressional Research Service* R43149 (Washington, DC: U.S. Government Printing Office, 2013).

Exhibit 2.C.1. Potential Releases Associated with Tailings Disposal

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
Embankment Failure	Embankment failure occurs when the structures bounding an impoundment are compromised due to structural instability, rotational sliding, seismic events and liquefaction (weakening of soil through shaking), or erosion from tailings that corrode impoundment walls. Embankment failure results in the release of tailings into local environment and, if located near a watershed, dispersal of tailings downstream.[574]	• Thorough geotechnical site characterization prior to construction.[575] • Monitor embankment stability.[576] • Add to embankment when necessary to contain tailings. • Include impervious core in embankment design.[577] • Use downstream embankment design.[578] • Construct embankment out of materials that resist liquefaction.[579] • Install liner in impoundment above tailings line to prevent corrosion.
Mine Drainage and Seepage	MIW (e.g., acid, alkaline, or neutral mine drainage), runoff originating from exposed tailings, is also a distinct risk. Water percolating through uncovered or otherwise exposed disposal facilities may contain residual process chemicals or mobilized	• Installing an appropriate liner system that can incorporate leak detection and drainage systems.[583] • As part of mine design targeted extraction

[574] U.S. Environmental Protection Agency, *Technical Report: Design and Evaluation of Tailings Dams* EPA530-R-94-038 (Washington, DC: U.S. Government Printing Office, 1994), p.36-38; and D.J.A. Van Zyl and J.N. Johnson, eds., "Chapter 8: Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p. 440-441.

[575] U.S. Environmental Protection Agency, *Technical Report: Design and Evaluation of Tailings Dams* EPA530-R-94-038 (Washington, DC: U.S. Government Printing Office, 1994), p. 18-21.

[576] U.S. Environmental Protection Agency, *Technical Report: Design and Evaluation of Tailings Dams* EPA530-R-94-038 (Washington, DC: U.S. Government Printing Office, 1994), p. 38; and D.J.A. Van Zyl and J.N. Johnson, eds., "Chapter 8: Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p. 442.

[577] D.J.A. Van Zyl and J.N. Johnson, eds., "Chapter 8: Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p. 435.

[578] U.S. Environmental Protection Agency, *Technical Report: Design and Evaluation of Tailings Dams* EPA530-R-94-038 (Washington, DC: U.S. Government Printing Office, 1994), p. 24, 26-28; and D.J.A. Van Zyl and J.N. Johnson, eds., "Chapter 8: Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p. 435.

[579] U.S. Environmental Protection Agency, *Technical Report: Design and Evaluation of Tailings Dams* EPA530-R-94-038 (Washington, DC: U.S. Government Printing Office, 1994), p. 38; and D.J.A. Van Zyl and J.N. Johnson, eds., "Chapter 8: Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p.440-441.

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
	contaminants. While residual chemicals are usually recycled with tailings water, trace elements from the ore are housed in the tailings and represent longer-term sources of possible contamination.[580] Further, drainage may react with sulfide minerals, creating acid drainage (which further mobilizes contaminants).[581] A variety of factors affect the rate of acid drainage generation from tailings including the water level within the pile, exposure to oxygen, and the presence of bacteria. Seepage involves the tailings breaching the storage facility and traveling into the groundwater or surface water. Although most commonly experienced with slurry tailings, seepage can also occur with thickened tailings, especially when exposed to precipitation. Breach can happen as a result of storage facility failure or through runoff that passes through the facility and carries tailings material with it. Seepage can occur in lined impoundments when the liner fails.[582] Further, impoundment failure via mine drainage or seepage and	techniques such as selective mining and avoidance could be used to minimize mining of ore resulting in leach tailings that could result in MIW.[584] • Production of paste or dry dewatered leach tailings to reduce potential for MIW.[585] • During operations special handling techniques such the addition of alkaline materials or amendments can be used to reduce potential for AMD from leach tailings.[586] • At closure leach tailings areas can be reclaimed using dry and wet covers to lessen or minimize discharges of MIW.[587]

583 U.S. Environmental Protection Agency, *Technical Report: Design and Evaluation of Tailings Dams* EPA530-R-94-038 (Washington, DC: U.S. Government Printing Office, 1994), p. 45-48.

580 See D.J.A. Van Zyl and J.N. Johnson, eds., "Chapter 8: Systems Design for Site Specific Environmental Protection," in *Mining Environmental Handbook: Effects of Mining on the Environment and American Environmental Controls on Mining*, ed. J.J. Marcus (London: Imperial College Press, 1997), p. 438 for recycling of supernatant with tailings water through decanting.

581 U.S. Environmental Protection Agency, Office of Solid Waste, Special Waste Branch, *Technical Resource Document: Extraction and Beneficiation of Ores and Minerals* EPA 530-r-94-013, Volume 2: Gold (Washington, DC: U.S. Government Printing Office, 1994).

582 U.S. Environmental Protection Agency, *Technical Report: Design and Evaluation of Tailings Dams* EPA530-R-94-038 (Washington, DC: U.S. Government Printing Office, 1994), p. 43-44.

584 The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.1.

585 The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.8.

586 The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.4.2.

587 The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.3.2.

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
Pipe Failure	Slurry tailings are piped from the processing facility to the impoundments. If the pipe fails at any point in the transportation process it discharges tailings to the local environment.[588]	• Monitor pipe stability regularly. • Install leak detection systems.[589]
Untreated Discharge	At processing facilities that do not reclaim water from tailings ponds, wastewater is sometimes treated and released into local waterways. If treatment fails, tailings water with constituent hazardous substances can be released.	• Install monitor for effluent discharge system.[590] • Capture using various hydrogeologic controls (e.g., cutoff wells, grout curtains, seepage controls).[591] In the event the mine drainage requires treatment prior to discharge, either during operations or post-closure, a variety of active, passive and in situ mine drainage treatment techniques are potentially applicable.[592]

[588] U.S. Environmental Protection Agency, *Technical Report: Design and Evaluation of Tailings Dams* EPA530-R-94-038 (Washington, DC: U.S. Government Printing Office, 1994), p. 30.

[589] See best practices for seepage control. Pipe failure leads to seepage from the fail point. U.S. Environmental Protection Agency, *Technical Report: Design and Evaluation of Tailings Dams* EPA530-R-94-038 (Washington, DC: U.S. Government Printing Office, 1994), p. 45 and 48.

[590] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.3.2.

[591] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.5.1.

[592] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 7.5.

TYPE OF RELEASE	DESCRIPTION	MANAGEMENT PRACTICES
Fugitive Dust	Fugitive dust can occur with both slurry tailings, when the tailings form a beach in the impoundment pond, or with thickened tailings. In high wind conditions fugitive dust can travel off-site, contaminating the local environment.[593]	• Manage tailings distribution to maximize surface moisture. • Spray tailings with water regularly. • Apply a dust suppressant on the tailings impoundment. • Crimp in straw to minimize erosion. • Monitor tailings impoundment daily.[594] • At closure, dry, wet, or vegetative covers can be used to lessen or minimize fugitive dust emissions.[595]

[593] See U.S. Environmental Protection Agency, *Technical Report: Design and Evaluation of Tailings Dams* EPA530-R-94-038 (Washington, DC: U.S. Government Printing Office, 1994), p. 2; for an example, see fugitive dust releases at the Climax Molybdenum Mine (MSHA ID 0502256), from U.S. Environmental Protection Agency, *Draft: Mining Waste Release and Environmental Effects Summary for the State of Colorado* (Washington, DC: U.S. Government Printing Office, 1994).

[594] All of the above from "Morenci Facts from FCX: Tailings Dust Management at Morenci," Freeport-McMoRan Copper & Gold Company, updated May 2011. Accessed December 3, 2015, at: http://www.fcx.com/sd/pdf/morenci_tailings_dust_mgmt.pdf.

[595] The International Network for Acid Prevention, *Global Acid Rock Drainage Guide* (Santiago, Chile: International Network for Acid Prevention Operating Committee, 2009), 6.6.3.2; and Monica O. Mendez and Raina M. Meier, "Phytostabilization of Mine Tailings in Arid and Semiarid Environments – An Emerging Remediation Technology," *Environmental Health Perspectives* 116:3 (March 2008), p. 279.

Facilities sometimes dispose of Bevill-exempt wastes in the same waste management units as non-exempt hazardous wastes, though.[596] In situations where facilities combine tailings with other wastes that exhibit hazardous characteristics, the waste mixtures may fall under RCRA Subtitle C regulations.

- **Water.** Untreated tailings may not be discharged into surface waters.[597] To comply with water quality standards under the CWA, mine operators must obtain permits under NPDES for any discharge of pollutant from a point source to waters of the United States.[598] For many hardrock commodities, EPA has promulgated ELGs requiring technology-based controls and establishing specific water quality standards.[599] These requirements address both mine drainage and process wastewater, which includes water contained in tailings. For discharges or pollutants not covered by the ELGs, EPA or the delegated state authority incorporates limits into permits on a site-specific basis. The NPDES program applies to both active and inactive mines, as well as abandoned mines where legally responsible owners or operators of point sources can be identified.

Runoff from tailings impoundments, spent ore piles, and waste rock piles may be regulated under NPDES stormwater permits.[600] Stormwater permits regulate stormwater contaminated by contact with material from mining activities, primarily requiring site-specific pollution prevention planning and/or implementation of mitigation practices.[601] These include treatment requirements, operating procedures, practices to control runoff, and monitoring.

While EPA issues and oversees point-source discharge permitting under Section 402 of the CWA, the USACE issues "dredge and fill" permits under Section 404 of the CWA. Under CWA Section 404, mining operations may need to obtain a permit from USACE to address the discharge of dredged or fill materials into surface water, including wetlands. In areas with

[596] An EPA survey of 106 facilities in 1989 indicated that 20 facilities placed mixtures of Bevill-exempt and non-exempt wastes in the same waste management unit. See: U.S. Environmental Protection Agency, *Mineral Processing Facilities Placing Mixtures of Exempt and Non-Exempt Wastes in On-site Waste Management Units: Technical Background Document Supporting the Supplemental Proposed Rule Applying Phase IV Land Disposal Restrictions to Newly Identified Mineral Processing Wastes* (Washington, DC: U.S. Government Printing Office, 2013).

[597] U.S. Environmental Protection Agency Region 10, *EPA and Hardrock Mining: A Source Book for Industry in the Northwest and Alaska* (Washington, DC: U.S. Government Publishing Office, 2003).

[598] Point sources are defined broadly, includes any discernable, confined, and discrete conveyance, such as a pipe, ditch, channel, tunnel, conduit, or container. "Waters of the United States" includes navigable waters, tributaries, interstate waters, intrastate waters used by interstate travelers, or for industrial purposes by industries engaged in interstate commerce. Generally, mining operations would fall under the Clean Water Act for process wastewater, mine drainage, and stormwater. See: U.S. Environmental Protection Agency Region 10, *EPA and Hardrock Mining: A Source Book for Industry in the Northwest and Alaska* (Washington, DC: U.S. Government Publishing Office, 2003).

[599] For example: 40 CFR 436 (mineral mining and processing); 40 CFR 440 (ore mining and dressing); 40 CFR Part 421 (nonferrous metals manufacturing).

[600] Seepage to groundwater is not considered a point source, and is not regulated under the Clean Water Act. The classification of point and nonpoint discharges from mining operations has evolved over time. For more information regarding current definitions of point sources from mining operations, see: *Greater Yellowstone Coalition v. Lewis*, 628 F.3d 1143 (9th Cir. Dec 23, 2010)

[601] Best management practices for stormwater permits are described at 40 CFR 122.2.

streams, wetlands, or lakes, construction and ongoing modifications of tailings storage facilities may trigger this requirement. Some regulatory uncertainty exists regarding how mining overburden, slurry, and tailings are regulated under the CWA, because of different definitions of fill material used by EPA and USACE. Thus, Section 404 permits have been issued for mining operations outside of NPDES permitting requirements.[602]

Mining operations on public federal land are subject to additional regulation. According to the BLM Section 3809 rules, mining operations must prevent unnecessary or undue degradation, which includes managing all tailings, rock dumps, deleterious material or substances and any other waste produced from mining operations.[603] BLM guidance indicates that proper disposal of mining wastes must involve siting of tailings facilities to minimize potential for environmental impact. Further, operators must conduct reclamation to maximize long-term stability and minimize the formation and release of leachate.[604] Requirements include:

- Operators must have low-permeability liners or containment systems to minimize the release of solution to the environment using best available technology, and must monitor for potential contaminant releases from tailings ponds.
- Operators must design, construct, and operate impoundments to contain precipitation from a local 100-year, 24-hour storm event.
- **Air contaminants.** EPA has limited ability to control fugitive dust emissions under the CAA.[605] In some cases, specific types of ores are subject to additional regulations addressing hazardous air pollution. For example, UMTRCA mandates special closure designs for uranium mill tailings ponds to prevent radon gas releases.[606]
- **Safety (impoundment failure).** The MSHA also requires inspections and safety standards for impoundments, retention dams, and tailings ponds, with a focus on mine worker safety.[607] MSHA publishes engineering and design guidelines for coal refuse

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602 C. Copeland, "Controversies over Redefining 'Fill Material' Under the Clean Water Act," *Congressional Research Service* RL31411 (Washington, DC: U.S. Government Printing Office, 2013).

603 43 CFR Part 3809

604 U.S. Department of the Interior, Bureau of Land Management, *Surface Management Handbook* H-3809-1 (Washington, DC: U.S. Government Printing Office, 2012), Section 5.3.2

605 U.S. Environmental Protection Agency Region 10, *EPA and Hardrock Mining: A Source Book for Industry in the Northwest and Alaska* (Washington, DC: U.S. Government Publishing Office, 2003).

606 UMTRCA, PL 95-604.

607 30 CFR Part 57, Subpart S. For more information, see: "Dam Safety Standards and Technical Guidance," MSHA. U.S. Department of Labor. Accessed October 30, 2015 at: http://www.msha.gov/DamSafety/DamSafetyTechGuidance.asp., and N. Merrifield. MSHA. U.S. Department of Labor. Reissue of I09-IV-1 Procedures for Documenting Inspections of Dams on Initial and Subsequent Regular Inspections. Procedure Instruction Letter No. I13-IV-01. May 31, 2013. Accessed December 2, 2015, at: http://www.msha.gov/regs/complian/PILS/2013/PIL13-IV-01.asp.

facilities, but not metal and nonmetal mines. The FEMA is also charged with administering a national dam safety program that includes tailings structures.[608]

State Regulations

Many states have operational, technology, and performance-based standards for general mining waste management and disposal in state solid waste regulations, state groundwater pollution laws, dam safety programs, or state mining laws. Generally, state and local governments implement solid waste management guidelines under RCRA Subtitle D, establishing operating and closure requirements that apply to all types of industrial waste disposal units. States with delegated authority also implement CWA regulations, with state programs being at least as stringent as federal regulations. Several state regulations specifically manage mine tailings, although in some cases tailings with no chemical additives are excluded from regulation. For example:

- **Alaska's** Department of Environmental Conservation Solid Waste Disposal Permit makes tailings from hardrock mines and tailings from placer mines that have been amalgamated or chemically treated subject to the State solid waste management general standards and requirements, which usually necessitate pre-operational, operation, and post-closure monitoring.[609]Tailings that have not been chemically treated, however, are not subject to regulation.
- **Arizona's** Groundwater Permit requires mines in active groundwater management areas to reduce water loss from tailings impoundments.[610]
- **California** manages mining wastes through the state's Porter-Cologne Water Quality Control Act. All mining units, including tailings structures, must comply with siting and construction standards. Disposal and management regulations for mining waste establish monitoring, closure, and maintenance requirements, which are based on wastes' potential hazard to water.[611]
- **Idaho's** Dam Safety Program regulates tailings structures through dam and impoundment structure requirements. The state oversees the construction, enlargement, alteration, repair, operation, and maintenance of dams and impoundments.[612]

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608 Federal Emergency Management Agency, *Strategic Plan for the National Dam Safety Program: Fiscal Years 2012 through 2016* FEMA P-916 (Washington, DC: U.S. Government Printing Office, 2012). Accessed December 1, 2015, at: https://www.fema.gov/media-library-data/8025e6039b9aebfa22e9f378347149c4/NDSP%20Strategic%20Plan_FEMA%20P-916.pdf.

609 Title 18 AAC Chapter 60 - Solid Waste Management.

610 ARS §45

611 27 CCR Div. 7.1

612 Idaho Code 42-17; IDAPA 37.06.06; IDAPA 37.03.05

- **Montana's** Hard Rock Mining Reclamation Act specifies that milling operations are subject to permitting, requiring a detailed description of the design, construction, and operation of the mill, tailings, and waste rock disposal facilities, and best management practices are expected in the disposal of tailings and other waste.[613]
- **Nevada's** regulations on hazardous materials require that tailings from active and inactive uranium and thorium mills be disposed of in a safe and environmentally sound manner.[614]

Non-Operating Sites and Currently Operating Facilities

Many of the sites reviewed below began operations before the promulgation of major environmental laws since 1980. Mines and mineral processing sites have continued to experience releases, however, because of their tailings disposal practices. Operators process ever-lower grades of ore because of economies of scale, technological improvements, and rising metal prices. Processing low-grade ore means producing relatively more tailings, and exploiting economies of scale leads to increased production and processing overall. Thus, contemporary mining practices produce a higher percentage of tailings and in greater volume than ever before.

In the below sample, documents confirmed at least eleven non-operating sites or currently operating facilities that experienced tailings-related releases after 1980, out of a total of 105 sites reviewed.[615]

This review of contemporary mines did not capture information characterizing the scope and efficacy of reclamation and closure practices. Improper and failed reclamation have been the basis for past CERCLA actions at hardrock mines, and remains a consideration in the environmental performance of contemporary mines.

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[613] ARM 17.24.101-ARM.17.24.189

[614] NRS 459.300-NRS459.370

[615] The sample considered above includes phosphate mine and processing facilities. Those facilities recover a commodity from ore and the waste (gypsum or phosphogypsum) is slurried and sent to lined or unlined stacks. Phosphate rock mining wastes are included among the categories of exempt special wastes from RCRA Subtitle C regulations, the 1980 Solid Waste Disposal Act Amendments, and the EPA Report to Congress on Wastes from the Extraction and Beneficiation of Metallic Ores, Phosphate Rock, Asbestos, Overburden from Uranium Mining, and Oil Shale. See U.S. Environmental Protection Agency Region 10, Record of Decision: Declaration, Decision Summary, and Responsiveness Summary for Eastern Michaud Flats Superfund Site (June 1998). See 42 U.S.C. 6901–6992k, Sec. 3001(b)3)A)(i-iii); and U.S. Environmental Protection Agency, Report to Congress: Wastes from the Extraction and Beneficiation of Metallic Ores, Phosphate Rock, Asbestos, Overburden from Uranium Mining, and Oil Shale, delivered 31 December 1985 (EPA530-SW-85-033).

Non-Operating Sites

Documents confirmed that 17 of the 29 non-operating mining and processing CERCLA sites reviewed generated tailings.[616] Of those 17 sites, tailings were responsible for releases at 12 of the sites. Activity at many of the sites extended back before the widespread use of impoundments, liners, and other tailings containment strategies. Thus, releases were largely due to the direct discharge of tailings into the local environment or inadequate impoundment. For example:

- The **Gilt Edge Mine** (EPA ID SDD987673985) is located near Lead, South Dakota. The site was a gold, silver, copper, lead and zinc mine. The site had been operated intermittently since 1876; mining ceased in 1998. Operations included a cyanidation circuit and a countercurrent decanter. Previous operators either dumped their tailings bearing acid and metals directly into nearby Strawberry Creek or left them uncontained close to the water. In 1986, BMC received a permit to work the site and removed over 200,000 tons of relic tailings to use as part of its heap leach operation. As of the 1980s, tens of thousands of tons of acid-generating tailings were reported in the Creek; Strawberry Creek is still devoid of aquatic life.[617]

At three of the 17 sites, however, releases of tailings occurred during or after the adoption of currently used tailings management procedures. These two sites exhibited discharges due to poorly maintained tailings structures or improper disposal methods:

- The **Cimarron Mining Corporation** (EPA ID NMD980749378) site is located near Carrizozo, Lincoln County, New Mexico. The facility housed an agitation mill. Zia Steel Inc. first operated the facility as an iron processing site in the late 1960s, and remained active on the site until 1979. In 1979, Southwest Minerals Corporation (a/k/a Cimarron Mining Corporation) acquired the site and converted it to a precious metal processing circuit involving the use of cyanide salt and a metal stripper. The site operated two mills. One of the mills discharged tailings into three piles: "C," "I" and "K." The other mill had two lined impoundments, both of which had torn lining. The tailings storage facilities at both sites appear to have been constructed after 1979, because the previous tailings from Zia Steel Inc. were transported away from the site and used as fill. The New Mexico

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[616] United Nuclear Corp. (EPA ID NMD030443303), Gilt Edge Mine (EPA ID SDD987673985), Bunker Hill Mining and Metallurgical Complex (EPA ID IDD048340921), Cyprus Tohono Mine (EPA ID AZD094524097), Tar Creek (Ottawa County) (EPA ID OKD980629844), Upper Tenmile Creek Mining Area (EPA ID MTSFN7578012), Asarco Inc. (Globe Plant) (EPA ID COD007063530), East Helena Site (EPA ID MTD006230346), Bueno Mill & Mine Site (EPA ID CON000802129), Summitville Mine (EPA ID COD983778432), Homestake Mining Co. (EPA ID NMD007860935), Cimarron Mining Corp. (EPA ID NMD0980749378), Fremont National Forest (EPA ID OR7122307658), Captain Jack Mill (EPA ID COD981551427), Silver Mountain Mine (EPA ID WAD980772789), California Gulch (EPA ID COD980717938), Blackbird Mine (EPA ID IDD980725832).

Note that it is likely, based on a review of mining and milling practices, that most if not all 29 non-operating sites reviewed generated tailings. Documentation specifically described tailings at seventeen sites, however.

[617] "National Priorities List Site Narrative: Gilt Edge Mine," Environmental Protection Agency. Accessed November 25, 2011 at: https://semspub.epa.gov/work/08/100000185.pdf.

Environmental Improvement Division inspected the site in 1980, 1982, and 1984, discovering the presence of cyanide and metals in the tailings piles themselves and in nearby soil and groundwater. The tailings also experienced surface drainage. Southwest ceased operations at the site in 1982 and declared bankruptcy in 1984.[618]

- The **Captain Jack Mill** (EPA ID COD981551427) is a Superfund site that incorporates the Big Five Mine, the White Raven Mine, and the Captain Jack Mill Works. Gold and silver mining activity at the site began in 1861 and continued intermittently through 1992. The Captain Jack Mill commenced operations in 1975, including the construction of tailings ponds. The EPA placed the site on the NPL in 2003 following the detection of antimony, arsenic, cadmium, copper, lead, manganese, thallium, and zinc in nearby Left Hand Creek. The primary source of contamination was AMD from the Big Five adit, which originated in the 19th century, although leaching and runoff were also detected originating from the Captain Jack tailings ponds constructed in the 1970s. Additionally, Paul Danio, an individual who operated the site in 1992, discharged mill tailings directly into Left Hand Creek before the Colorado Division of Minerals and Geology intervened.[619]
- The **Cyprus Tohono Mine** (EPA ID AZD094524097) is a surface copper mine located in Casa Grande, Arizona. Activity began at the site in 1881. In 2009, the mine was moved into "care and maintenance." The most recent operator was the Cyprus Tohono Corporation, a subsidiary of Freeport-McMoRan Copper and Gold, Inc., which took over the site in 1987. Cyprus Tohono Corporation expanded the extant surface mining activity and heap leach operations. In 2005, Cyprus Tohono Corporation began operating a solvent extraction/electrowinning circuit for processing heap leach solution. In 2000, EPA-initiated groundwater investigations uncovered elevated sulfate and uranium concentrations beneath the tailings impoundments. It is unclear when the impoundments were constructed.[620] Although copper operations continue at this mine, CERCLA

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[618] U.S. Environmental Protection Agency, *Decision Summary: Cimarron Mining Operation Site Operable Unit 1, Record of Decision* (Washington, DC: U.S. Government Printing Office, 1990); U.S. Environmental Protection Agency, *Decision Summary: Cimarron Mining Operation Site Operable Unit 2, Record of Decision* (Washington, DC: U.S. Government Printing Office, 1990); and "Online Site Description: Cimarron Mining Co.," Environmental Protection Agency. Accessed January 13, 2012: https://nepis.epa.gov/Exe/ZyNET.exe/20013XZ4.TXT?ZyActionD=ZyDocument&Client=EPA&Index=1986+Thru+1990&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C86thru90%5CTxt%5C00000015%5C20013XZ4.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=hpfr&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL.

[619] Colorado Department of Public Health and Environment, *Final Captain Jack Superfund Site Remedial Investigation and Risk Assessment Report* (22 May 2008).

[620] "Superfund Site: Cyprus Tohono Mine," U.S. Environmental Protection Agency, Region 9. Accessed December 14, 2015, at: http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/84e3d3f748094337882572330079 4f02/b3a939aef4ee637788257acb006a16ec!OpenDocument.

removal actions have addressed contamination from former tailings impoundments and process ponds.

Currently Operating Facilities

Documents confirmed the generation of tailings for least 31 of the 70 currently operating facilities reviewed.[621] Of those 31 sites, tailings were involved in releases or environmental contamination at eleven of the facilities. Activity at many of the facilities extended back before the widespread use or regulatory requirement of impoundments, liners, and other tailings containment strategies. Thus, many releases before 1995 were due to the direct discharge of tailings into the local environment or inadequate impoundment.

At nine of the 11 facilities, however, releases due to tailings occurred during or after the and the adoption of currently used tailings management practices.

- **ArcelorMittal Minorca** (MSHA ID 2102449) is an iron mining and processing facility located in Virginia, Minnesota. Mining at the site began in 1974 and an iron pellet processor was constructed at the site in 1977. Mittal Steel USA began operating the site in 2007. Three failures in the tailings and waste rock pipe and tailings dike at the site occurred in 2013 and 2014, discharging 8,500 cubic yards of tailings and waste rock and affecting 15.3 acres of wetlands, potentially destroying the area's ability to function as a natural aquatic habitat and filtration system. It is unclear when the tailings and waste rock pipe and impoundment were installed.[622]
- **Morenci** (MSHA ID 200024) is a surface copper mine, operated as a joint venture between Freeport (85 percent) and Sumitomo (15 percent) located in Morenci, Arizona. Activity at the site began in 1881. Currently, the site operates a crushed-ore leach pad and

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[621] ArcelorMittal Minorca (MSHA ID 2102449), Asarco Ray (MSHA ID 0200150), Asarco Silver Bell (MSHA ID 0200134), Buckeye Olive Creek (MSHA ID 5000304), Coeur Kensington (MSHA ID 5001544), Cyprus Tohono (MSHA ID 0202579), Florida Canyon Mine (MSHA ID 2601947), Freeport McMoRan Henderson (MSHA ID 0500790), Freeport McMoRan Morenci (MSHA ID 2000024), Hecla Greens Creek (MSHA ID 5001267), Kinross Crown Resources Buckhorn Mine (MSHA ID 4503615), Rio Tinto Kennecott Bingham Canyon (MSHA IDs 4200149 and 4201996), Robinson Nevada (MSHA ID 2601916), Simplot Smoky Canyon/Don (MSHA ID 1001590), Sixteen to One Mine (MSHA ID 401299), US Silver Galena (MSHA ID 1000082), Veris Gold Saval 4 – Jerritt Canyon (MSHA IDs 260742 and 2601621), CML Iron Mountain (MSHA IDs 4201927 and 4202624), Molycorp Mountain Pass (MSHA ID 402542), Barrick Goldstrike Mine/Mill/Roaster (MSHA IDs 2601089, 2602673, and 2602674), Energy Fuels White Mesa (MSHA ID 4201429), Freeport McMoRan Climax (MSHA ID 0502256), Materion Delta (No MSHA ID), Stillwater East Boulder (MSHA ID 2401879), Stillwater Stillwater/Columbus (MSHA ID 2401490), Freeport McMoRan Tyrone (MSHA ID 2900159), Nyrstar East Tennessee Complex-Young (MSHA ID 4000170), Rye Creek (MSHA ID 2402602), Salauro Tonopah (MSHA ID 2602718), Simplot Smoky Canyon/Don (MSHA ID 1001590), Mosaic South Pasture Hardee (MSHA ID 0800903), US Magnesium (No MSHA ID).

Note that it is likely, based on a review of mining and milling practices respective to tailings, that most if not all 70 of the current sites reviewed above generated tailings. We were only able to find documentation of tailings at the above 31 sites, however. Note, too, that Cyprus Tohono was part of both the non-operating site sample and the currently operating facility sample.

[622] "Enforcement and Compliance History Online: Case No. 05552000151009" and "Enforcement and Compliance History Online Case No. 0520151010," Environmental Protection Agency. Accessed December 10, 2015; "Pipeline, Storage Basin Failures Send Ore Tailings and Road Aggregate into Wetlands," Minnesota Pollution Control Agency, June 24, 2015. Accessed December 10, 2015, at: http://www.pca.state.mn.us/index.php/about-mpca/mpca-news/current-news-releases/pipeline-storage-basin-failures-send-ore-tailings-and-road-aggregate-into-wetlands-2-enforcement-actions-result.html; and "ArcelorMittal Pays Fines, Cleans Up," *Hibbings Daily Tribune* (26 June 2015).

stacking system, low grade run-of-mine leaching system, four solvent extraction plants, and three electrowinning tank houses. The facility transitioned from a smelting processing to solvent extraction/electrowinning in 1987. It is unclear when the site installed the tailings impoundments currently in use. In 2000 and 2001, it was discovered that rainwater ponds formed on the Morenci tailing impoundments were highly acidic and led to death and other injuries to migratory birds.[623]

- **Hecla Greens Creek** (MSHA 5001267) is a lead, zinc, silver, and gold underground mine located near Juneau, Alaska, and operated by the Hecla Greens Creek Mining Company. The mill produces 650,000 tons of tailings annually. Tailings are dewatered in a filtered press; half the tailings are mixed with concrete and hauled into the mine to serve as backfill, while half are placed in a disposal facility. In 2013, elevated concentrations of metals were detected in the snow and lichens adjacent to the tailings disposal facility. The USFS, who installed the lichen to act as a biomonitor of the recently expanded tailings facility, concluded the contamination was the result of fugitive dust emissions from the tailings.[624]
- The **Robinson Operation** gold and copper surface mine (MSHA ID 2601916) is operated by the Robinson Nevada Mining Company and located in White Pine County, Nevada. The facility processes its ore with a flotation circuit. In 1996, while the site was operated by BHP Copper subsidiary Magma Nevada Mining Company, five releases of copper flotation tailings solution containing sodium cyanide, a CERCLA hazardous substance under sections 102-103, occurred due to equipment failure; they ranged in size from 1,500 gallons to 66,000 gallons.[625] It is unclear when the tailings equipment was constructed. Four of the five spills resulted in soil contamination, and one spill contaminated a downstream drainage bed for 2.3 miles with an average flowpath of three feet.[626]
- The **U.S. Silver Galena mine** (MSHA ID 1000082) is a silver-lead and silver-copper underground mine located near Wallace, Idaho, and operated by the U.S. Silver Corporation since 2007. The mine sends tetrahedrite ore and galena-bearing ore to the Galena and Coeur mill facility; both use a flotation circuit to process the ore. In 2014,

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[623] "Natural Resource Injury Case Settled for Freeport-McMoRan Morenci Mine," Arizona Department of Environmental Quality, Arizona Game and Fish Department, U.S. Fish and Wildlife Services, July 2, 2012. Accessed December 1, 2015: http://azgfd.net/artman/publish/NewsMedia/Natural-resource-injury-case-settled-for-Freeport-McMoRan-Morenci-Mine.shtml. See also "Morenci Mine Description," Freeport-McMoRan. Accessed December 10, 2015, at: http://www.fcx.com/operations/USA_Arizona_Morenci.htm.

[624] United States Department of Agriculture, Forest Service, *Greens Creek Mine Tailings Disposal Facility Expansion: Final Environmental Impact Statement and Record of Decision* (Washington, DC: U.S. Government Printing Office, 2013), Volume 1.

[625] For CERCLA status, see U.S. Environmental Protection Agency, EPCRA/CERCLA/CAA §112(r) Consolidated List of Lists (March 2015).

[626] U.S. Environmental Protection Agency, *Damage Cases and Environmental Releases from Mines and Mineral Processing Sites* (Washington, DC: U.S. Government Printing Office, 1997).

U.S. Silver Corporation signed a Consent Agreement and Final Order with EPA Region 10 admitting to discharging wastewater from the Osburn tailings pond into Lake Creek and the Coeur d'Alene River that carried excessive concentrations of mercury and copper in 2012 and 2013. The discharge was the result of a failure to monitor treated water normally discharged to water system. U.S. Silver also admitted that on March 14, 2014, it discharged tailings slurry directly into Lake Creek.[627]

- The **Veris Gold Jerritt Canyon Site** (MSHA ID 2602742; 2601621) is a gold mine located in Elko County, Nevada, first operated in 1980 and now operated by Queenstake Resources USA, Inc., a wholly owned subsidiary of Yukon-Nevada Gold Corporation. The site includes 12 closed surface mines (four reclaimed) and five underground mines. The facility processes the ore through crushing, roasting, carbon-in-leach with cyanidation and carbon adsorption, Merrill-Crowe process using zinc, and precipitate refining. Ore is sent to a lined tailings impoundment. In 1991, a Finding of Alleged Violation was issued because of a cyanide plume in the groundwater caused by seepage from the impoundment. In response, the facility installed a seepage collection system to pump any seepage back to the storage facility.[628] The tailings facility experienced additional releases of mercury due to a faulty seepage return line in 2013.[629]
- **Molycorp Mountain Pass** (MSHA ID 402542) is an open-pit lanthanide mine, beneficiation, and processing facility in Mountain Pass, California, currently operated by Molycorp and active since 1950. It processes its ore using bioleaching, a flotation process, and solid phase extraction. The facility now disposes of tailings as solid paste tailings in a dry stack facility, but the site houses old tailings ponds. On May 26, 1989, approximately 3,375 gallons spilled from a damaged pipeline carrying tailings water and effluent from the separation plant. The spill was contained in an on-site stormwater pond.[630]
- The **Energy Fuels White Mesa Mill** (MSHA ID 4201429) is a uranium milling and tailings disposal facility six miles south of Blanding, Utah. The tailing impoundments are four cross-valley dikes with embankments of native granular materials, lined with 30-millimeter PVC flexible membrane liners underlain with crushed sandstone; cells 2 and 3

[627] U.S. Environmental Protection Agency, *Consent Agree and Final Order In the Matter of U.S. Silver – Idaho Inc., Coeur and Galena Mines and Mills, Wallace, Idaho*, effective 16 September 2014.

[628] Draft Report for E.P.A. Review: "Financial Responsibility Cost Estimate Review," August 10, 2012.

[629] Office of Resource Conservation and Recover. "Discharges from Hardrock Mines and Mineral Processors Operating in the Modern Mining Era (1978-Present)." September 29, 2016.

[630] U.S. Environmental Protection Agency, *Draft: Mining Waste Releases and Environmental Effects Summaries for the State of California* (Washington, DC: U.S. Government Printing Office, 1994. Note that Molycorp has changed the status of its Mountain Pass mine to "Care and Maintenance Mode" as of August, 2015. See "News Release: Molycorp to Move Its Rare Earth Facility to 'Care and Maintenance Mode,'" Globe News Wire, November 26, 2015. Accessed December 10, 2015, at: https://globenewswire.com/news-release/2015/08/26/763530/0/en/Molycorp-to-Move-Its-Mountain-Pass-Rare-Earth-Facility-to-Care-and-Maintenance-Mode.html.

have slime drainage systems. Tailings are in the form of a slurry, and the tailings cells are uncovered.[631] In 2015, the Utah Department of Environmental Quality discovered that radon emissions from the tailings cells exceeded by up to 80 times the limits established in the CAA for impoundments constructed before 1989,[632] even from the newly constructed cell 4. The investigation is ongoing.[633]

- The **Climax Molybdenum** open-pit mine (MSHA ID 0502256), located in Lake County, Colorado, has been active since 1918. Climax Molybdenum, a subsidiary of Freeport-McMoRan, currently operates the mine. The processing facility operates a flotation circuit. Flotation tailings are sent via pipelines to ponds, where sands settle out and water is decanted back to the mill for reuse. The decanting left a tailings "beach" in the impoundments. In 1986, the Colorado Mined Land Reclamation Board issued a Notice of Violation because it discovered that high winds had carried tailings dust from the impoundments and dam off-site. It is unclear when the impoundment was constructed.[634]

The sample of 70 currently operating facilities considered did not include an example of a release from phosphogypsum stacks. Additional research showed that on October 1, 2015, Mosaic Fertilizer, LLC agreed to an $8 million civil penalty to the United States, the State of Louisiana, and the State of Florida because of violations related to corrosive materials it disposed with its phosphogypsum stacks at Mosaic's New Wales, Bartow, and Riverview facilities in Florida, and its Uncle Sam facility in Louisiana.[635]

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[631] Utah Department of Environmental Quality, Ground Water Discharge Permit No. UGW370004, granted to Energy Fuels Resources (USA) Inc. for milling and tailings facility located approximately 6 miles, effective 24 August 2012.

[632] Limits from Clean Air Act National Emission Standards for Hazardous Air Pollutants, 40 C.F.R., Part 61, Subpart W. Note that those limits were set in 1989, no radon emission standards were set for new impoundments at the time.

[633] "Air Quality Board Meeting on Radon Emissions from White Mesa Uranium Mill Liquid Effluents," Utah Department of Environmental Quality, May 6, 2015. Accessed December 1, 2015: http://www.utah.gov/pmn/files/155851.pdf.

[634] U.S. Environmental Protection Agency, Office of Solid Waste, *Human Health and Environmental Damages from Mining and Mineral Processing Wastes* (Washington, DC: U.S. Government Printing Office, 1995).

[635] "Mosaic Fertilizer, LLC Settlement," U.S. Environmental Protection Agency, October 1, 2015. Accessed December 2, 2015, at http://www2.epa.gov/enforcement/mosaic-fertilizer-llc-settlement.

D. Leaks and Spills Resulting in Releases from Mining and Associated Processes

Mining and associated processes have an inherent potential for leaks and spills, which may result in releases. Many different commodities and process chemicals are used in hardrock mining activities, and often transport is required between subsequent processing steps, thus increasing the risk of releases. In addition, operators may use toxic process chemicals, increasing the potential for harm associated with these releases.

Documentation does not suggest that operational leaks and spills were major factors in the listing of non-operating Superfund sites, but these types of releases are documented as relatively common occurrences at currently operating facilities. From 1990-2014, over 2,000 spills at U.S. hardrock mining and mineral processing facilities were reported to the National Response Center.[636]

Operational spills and leaks occur during three main activities:

- leaks from process plants, which occur during the many processes used to purify and concentrate ore,
- leaks from equipment, which are generally not directly mining-related but are releases of chemicals and hazardous substances from machines used in the mining process, and
- leaks from transit, which occur when both ore and process chemicals are being transported to or between sites, processing operations and waste management facilities.

Sources of Spills and Leaks

All processing of ore, including physical and magnetic processing, can result in releases of intermediate material and waste. Ore must be transported from the extraction site to the processing facility. Process water and solutions are often stored in ponds on site for use and recycling. Slurries are piped from mill facilities to storage facilities (which can include waste management features such as tailings ponds) by pipeline, truck, or conveyor. The slurry, made up of ore and process chemicals, can contain mobilized contaminants and other hazardous substances. Based on reports to the National Response Center, equipment failure (e.g., pipe breaking, tank leakage) and human error are the most common reasons for these types of incidents.

Leaks also often occur due to liner failures, containment failures during transport or at exchange points (e.g., conveyor drop points or truck offloads), and defects in pipe seams. Operator error, such as mishandling of solutions (e.g., over-application) or equipment, and severe weather events that overwhelm containment systems can contribute to these types of leaks. Non-processing

[636] The National Response Center, maintained by the U.S. Coast Guard (and previously also by EPA), aggregates and publishes reported toxic chemical spills and other accidents. This database was previously referred to as ERNS. Reports, including incident and facility details, are published at: http://www.nrc.uscg.mil/.

equipment, such as excavation machinery and transport trucks, can also cause releases of petroleum products, lubricants, hydraulic fluid and other hazardous substances.[637]

Regulations Related to Leaks and Spills

Federal agencies and most states have developed regulations specific to chemical spills under emergency management and accident prevention frameworks.

The Emergency Planning and Community Right-to-Know Act (EPCRA) Emergency Release Notification Requirements dictate that any accidental chemical release exceeding the applicable minimal reportable quantity must be reported to the State Emergency Response Commissions (SERCs) and the National Response Center. The facility must also provide written follow-up information afterwards and information about the release must be available to the public.[638] The National Response System, which is informed by the National Oil and Hazardous Substances Pollution Contingency Plan, Clean Water Act, and CERCLA helps coordinate the response to such events. According to National Response Center information, most reported incidents are handled by the operator on-site, but in some cases, state or federal officials are involved in the response effort.

Legal protocols exist to ensure proper handling and on-site response to prevent and mitigate accidental releases. For example, under the BLM's 43 CFR Subpart 3809, a spill contingency plan is required for every Plan of Operations that involves chemical processing or the use or storage of hazardous substances.[639] These plans must describe what measures an operator will take to avoid releases of chemicals or hazardous substances including transport, storage, handling and disposal as well as how an operator will respond to a release, including containment and clean-up procedures, enhanced monitoring measures and notification procedures to the appropriate regulatory agencies.

States also have programs to prevent and respond to releases and can also impose their own notification and inspection requirements. Alaska's Department of Environmental Conservation, for example, administers their Spill Prevention and Response program, which includes a risk reduction program for underground storage tanks and spill prevention education and technical assistance.

Evidence from Contemporary Mining and Processing Facilities

The National Response Center maintains records of the chemical releases and accidents in the United States that are reported to them. While releases occur relatively frequently, little information is available about long-term outcomes. As a result, the ultimate harm caused by operational spills and releases is difficult to quantify.

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[637] Petroleum is specifically excluded as a CERCLA hazardous substance, so is not subject to CERCLA response authority and liability.

[638] EPCRA Section 304.

[639] 43 CFR 3809.401(b)(2)(vi).

From 1990-2014, 2,040 incidents were reported at hardrock mining and mineral processing facilities, with 63 percent of reported incidents originating from process equipment, tanks, or pipes. The most frequent causes of reported incidents include equipment failure (54.4 percent) and employee error (14.6 percent). Only 5.4 percent of incidents were a result of severe weather events or other natural phenomena. Relatively few reported incidents were the result of transport accidents or illegal dumping.[640]

ERNS reports contain limited information about cleanup or enforcement actions taken after facility notification, and suggest that most spills are handled by the operator on-site. Local authorities were notified for approximately 15 percent of incidents. Roughly 17 percent of incidents involved spills of one of the ten highest-ranked hazardous substances of concern.[641]

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[640] Releases of CERCLA hazardous substances associated with transportation may also be within the jurisdiction of Department of Transportation regulations.

[641] Pursuant to CERCLA Section 104(i), the EPA and the Agency for Toxic Substances and Disease Registry (ATSDR) develop a biennial Substance Priority List (SPL) that ranks substances most commonly found at Superfund National Priority List (NPL) facilities and which are determined to pose the most significant potential threat to human health. Rankings reflect frequency, toxicity, and potential for human exposure at NPL sites. Although the SPL reports a toxicity score, this measure is categorical rather than linearly ordered. Toxicity and overall SPL ranking are highly correlated, however. ATSDR assigned seven of the top 10 SPL substances the highest toxicity score, while the other three were associated with the second highest toxicity category. See: "Priority List of Hazardous Substances," Agency for Toxic Substances & Disease Registry. Accessed January 20, 2015, at: http://www.atsdr.cdc.gov/spl/.

Appendix I: Summary of Approach Used to Generate a Sample of Non-Operating Sites

This document discusses the approach EPA applied to generate a sample of non-operating CERCLA sites to be researched and reviewed. It also briefly summarizes the distribution of sites in the sample across commodity groups, geographical location, and operations type.

Relevant information for the non-operating sites will be collected on a sample, or incremental, basis, recognizing that "knowing more" about a smaller sample of these sites may be more valuable than "knowing less" about all of the sites. Thus, EPA developed the sample of non-operating sites across commodity groups to include the sites with more robust operational and risk data. EPA also identified the non-operating sites for which data have been previously collected.

Steps Taken to Identify and Review the Sites within the Proposed Site Sample

The proposed sample of sites (29 in total) represents 28 percent of all sites within the non-operating CERCLA universe (102 in total). The list below summarizes the steps taken to generate the non-operating site sample:

- Identify the sites within the current version of the non-operating universe for which risk data were previously collected or an attempt was made to collect those data: 31 sites total.
- Identify the sites within the current version of the non-operating universe which were previously included on EPA's lists of response action sites that met certain EPA criteria (i.e., response action occurred, site met EPA's 2012 definition of mine or processor, contamination from onsite). Limited operating data have been collected for these sites (89 sites total).
- Match the non-operating universe's commodity group categories to commodity group categories within the currently operating universe. Remove sites within the "mixed" non-operating commodity groups that include multiple commodity groups (e.g., "Mixed: More Than Three Commodities [including Radioactives]"). Note, the analysis excludes "mixed commodity group" sites that mined or processed commodities from more than three commodity groups. This is necessary in order to isolate the operational and risk data associated with specific commodity groups and collect useful data that would allow ultimate comparisons with the facilities in the same commodity groups within the currently operating universe.
- Review the distribution of sites within the resulting sample of the non-operating sites (sites for which the three criteria described in steps 2, 3, and 4 above are true – 27 sites total) and compare this distribution to the distribution of facilities by commodity group and type of operation (mine/processor) within the currently operating universe.

- For commodity groups that appeared under-represented (one site per commodity group), review the non-operating universe data to determine whether additional sites could be included in the sample.
- The following commodity groups only have a single site each within the non-operating universe: “Mixed: Aluminum & Ferrous Metals & Non-Ferrous Metals,” “Mixed: Ferrous Metals & Non-Ferrous Metals,” and “Rare Earth Minerals.” The three sites in these commodity groups were included in the proposed non-operating sample.
- For Phosphate and Radioactive Metals commodity groups, review the data to manually select an additional mine site to increase the representation of mines within the sample:
- For Phosphates, EPA selected the additional mine on the non-operating site list that appeared to have the most data available (NAICS[642] codes, operations start and end date, ATSDR Public Health Assessment available) [Coronet Industries, FLD001704741]
- For Radioactive Metals, EPA selected the only remaining mine on the non-operating site list that had a Final NPL status [Westlake Landfill OU2, MOD079900932]

The above process resulted in a total of 29 sites within the proposed non-operating sample, out of 102 sites within the non-operating universe.

Summary of the Proposed Non-Operating Site Sample

Exhibit I.1. at the end of this memorandum summarizes the distribution of sites within the sample by commodity group and type of operation, and compares it to the distribution of sites within the currently operating universe. Exhibit I.2. provides a summary of locations of sites within the proposed non-operating sample.

As Exhibit I.1. shows, each commodity group is adequately represented within the proposed non-operating sample relative to the currently operating facilities list. While several groups may be relatively over-represented (phosphates, radioactive metals, and mixed: industrial rocks and non-ferrous metals groups), this occurs because of the low total number of sites within these groups.[643] Where the groups are under-represented with a single site in the universe, this occurs due to the fact that only a single site within this commodity group exists within the non-operating universe.

[642] North American Industry Classification System (NAICS)

[643] EPA aimed to include at least three sites within the proposed non-operating sample for each commodity group where the total number of sites within the non-operating universe allowed this.

Of the 29 sites within the proposed sample, 26 sites are on the NPL (as Final, Proposed, or Deleted sites) and three sites are not on the NPL. Removal actions have occurred at 20 sites; eight sites did not have removal actions. Removal action information is not provided for one site.

At this time, EPA is unable to determine the distribution of geological/hydro-geological features within the proposed site sample because there are no such data readily available for the sites within the non-operating universe. Finally, none of the sites within the proposed non-operating sample are known to have conducted sand and/or gravel mining prior to waste disposal.

Exhibit I.3. summarizes the distribution of individual commodities for all sites within the non-operating universe, for the currently regulated universe, and for the proposed sample of 29 non-operating sites. The distribution of commodities within the non-operating universe varies from that within the currently regulated universe. For example, gold was one of the commodities mined/processed at 31 percent of non-operating sites; the same value for the currently operating universe is 46 percent.[644] As another example, 26 percent of non-operating sites mined/processed silver; silver is the primary commodity for only 2 percent of facilities within the currently operating universe.

Emphasis was placed on selecting more recently active and listed NPL sites. These sites, with more recent operational and listing dates, were given priority so the collected risk related data is reflective of more current remedial technologies and mitigation practices. A modification of site selection criteria was required, in which EPA decided to only include sites with available ROD summaries (provided by EPA) in order to accelerate data abstraction in the limited time frame.

Conclusion

This analysis relied on a subset of sites for which risk data have already been collected, and to which EPA (subject to data availability and resource limitations): (a) further supplemented the risk data for the subset of sites; (b) attempted to collect similar information for sites which have not been previously reviewed; and (c) filled out operational and other information as necessary.

[644] Each facility within the currently operating universe includes information on a single commodity mined/processed. The majority of non-operating sites list multiple commodities mined/processed. Further research will be necessary to identify the primary commodity mined/processed at each non-operating site (if any).

Exhibit I.1. Summary of Proposed Non-Operating Site Sample with Representativeness in Currently Operating Universe

Combined Commodity Categories	Proposed Non-Operating Site Sample					Currently Operating Universe				Notes
	# Sites	# Sites, % Total	# Mines	# "Other"	# "Pilot Sites"	# Facilities in Comparable Commodity Group	% Facilities in Comparable Commodity Group	# Mines	# Processors	
Mixed: Aluminum & Ferrous Metals & Non-Ferrous Metals	1	3%	0	1	0	21	5%	5	16	- The single site in the non-operating universe that mentions "Aluminum" specifically - A potential commodity group match for "Aluminum and Ferrous Metals" groups in the currently operating universe
Mixed: Ferrous Metals & Non-Ferrous Metals	1	3%	0	1	1	37	9%	27	10	- The single site in the non-operating universe with "Ferrous Metals" - A match for "Ferrous Metals" group in the currently operating universe
Mixed: Industrial Rocks & Non-Ferrous Metals	3	10%	2	1	2	25	6%	21	4	A match for "Industrial Rock" group in the currently operating universe
Non-Ferrous Metals	15	52%	7	8	8	312	72%	263	49	
Phosphates	4	14%	1	3	3	17	4%	11	6	
Radioactive Metals	4	14%	2	2	2	12	3%	11	1	
Rare Earth Minerals	1	3%	0	1	1	11	3%	5	6	The single site in the non-operating universe in this commodity category
Total:	**29**	**100%**	**12**	**17**	**17**	**435**	**100%**	**343**	**92**	

Exhibit I.2. Summary of Proposed Non-Operating Site Sample by Location

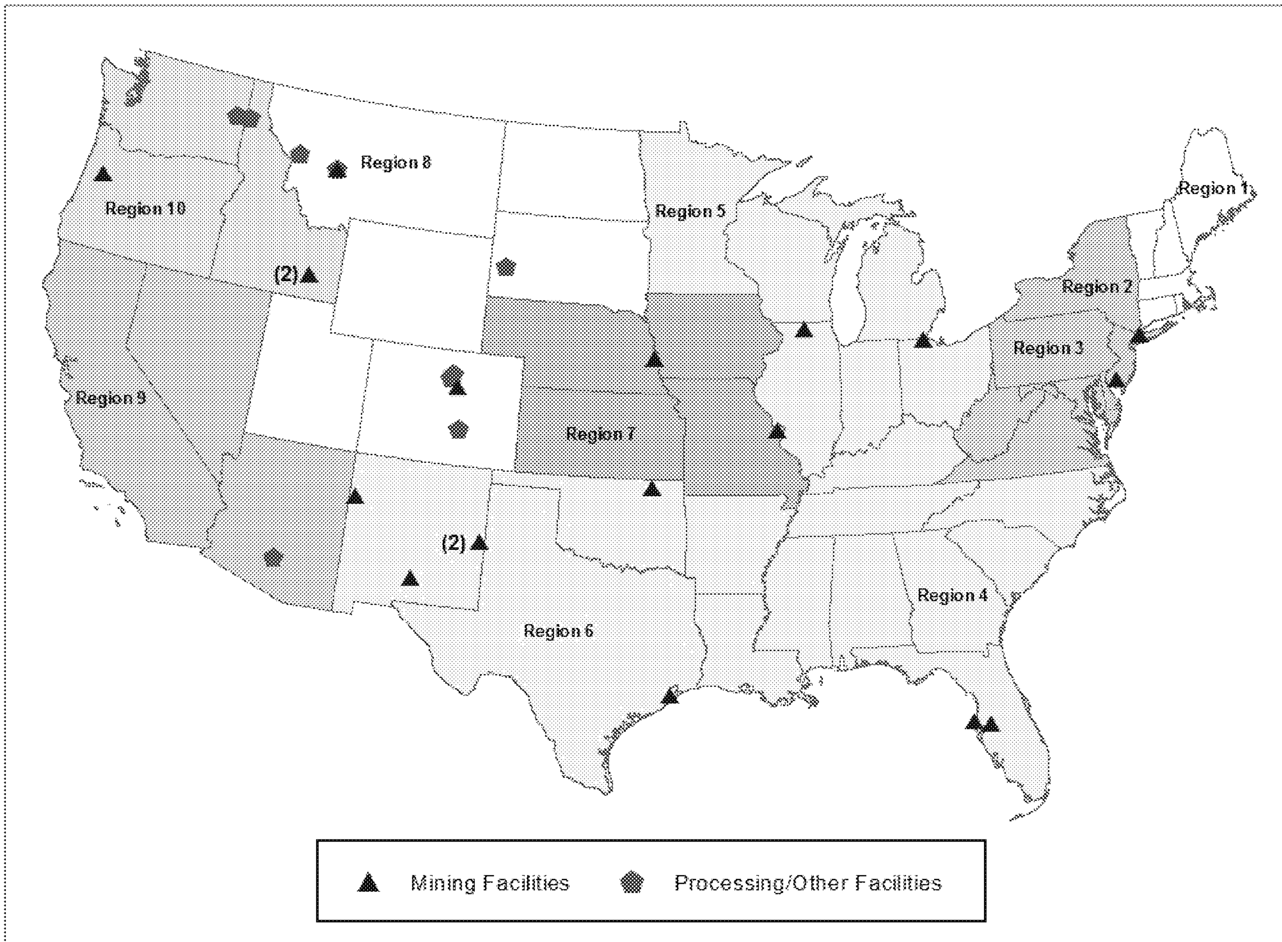

Exhibit I.3. Summary of Proposed Non-Operating Site Sample by Commodity Compared to Currently Operating Universe

Commodity Counts	Non-Operating Universe		Currently Operating Universe		Proposed Non-Operating Sample	
	# Sites	# Sites as a % of Total	# Sites	# Sites as a % of Total	# Sites	# Sites as a % of Total
Gold	32	31%	201	46.2%	8	28%
Silver	27	26%	7	1.6%	7	24%
Copper	24	24%	48	11.0%	7	24%
Lead	20	20%	8	1.8%	5	17%
Zinc	18	18%	7	1.6%	5	17%
Phosphorus or Phosphate	17	17%	17	3.9%	5	17%
Uranium	13	13%	12	2.8%	3	10%
Sulfur/Sulfuric Acid	8	8%	0	0%	2	7%
Molybdenum	6	6%	14	3.2%	1	3%
Vanadium	5	5%	0	0%	1	3%
Antimony	5	5%	3	0.7%	3	10%
Arsenic	4	4%	0	0%	1	3%
Limestone	4	4%	0	0%	0	0%
Tungsten	4	4%	1	0.2%	2	7%
Fluorspar or Fluorite, Fluoride Compounds	3	3%	1	0.2%	1	3%
Sodium Metal or Compounds	3	3%	0	0%	1	3%
Bismuth	2	2%	0	0%	2	7%
Cadmium	2	2%	1	0.2%	2	7%
Clay	2	2%	0	0%	0	0%
Cobalt	2	2%	1	0.2%	2	7%
Iron	3	3%	38	8.7%	1	3%
Gravel	2	2%	0	0%	1	3%
Magnesium	2	2%	1	0.2%	0	0%
Niobium	2	2%	0	0%	2	7%
Platinum	2	2%	3	0.7%	1	3%
Precious Metals	2	2%	0	0%	0	0%
Pyrite	2	2%	0	0%	1	3%
Quartz	2	2%	0	0%	1	3%
Radium	2	2%	0	0%	0	0%
Sand	2	2%	0	0%	1	3%
Tantalum	2	2%	0	0%	1	3%
Tin	2	2%	0	0%	2	7%
Thorium	2	2%	0	0%	0	0%

Commodity Counts	Non-Operating Universe		Currently Operating Universe		Proposed Non-Operating Sample	
	# Sites	# Sites as a % of Total	# Sites	# Sites as a % of Total	# Sites	# Sites as a % of Total
Aluminum	1	1%	10	2.3%	1	3%
Asbestos	1	1%	0	0%	0	0%
Chalcopyrite	1	1%	0	0%	1	3%
Chlorine	1	1%	0	0%	1	3%
Chromium and Compounds	1	1%	1	0.2%	1	3%
Columbium	1	1%	0	0%	0	0%
Galena	1	1%	0	0%	1	3%
Hafnium	1	1%	0	0%	1	3%
Indium	1	1%	2	0.5%	1	3%
Lepidolite	1	1%	0	0%	0	0%
Lithium	1	1%	2	0.5%	0	0%
Manganese	1	1%	0	0%	0	0%
Nickel	1	1%	0	0%	1	3%
Rare Earths	1	1%	4	0.9%	1	3%
Rhenium	1	1%	0	0%	0	0%
Silica	1	1%	0	0%	0	0%
Steel	2	2%	0	0%	1	3%
Tetrahedrite	1	1%	0	0%	0	0%
Tellurium	1	1%	1	0.2%	1	3%
Thallium	1	1%	0	0%	1	3%
Titanium	1	1%	4	0.9%	1	3%
Zirconium	1	1%	4	0.9%	1	3%
Alumina	0	0%	4	0.9%	0	0%
Barite Barium Ore	0	0%	10	2.3%	0	0%
Bauxite	0	0%	7	1.6%	0	0%
Beryllium	0	0%	3	0.7%	0	0%
Boron	0	0%	5	1.1%	0	0%
Brucite	0	0%	2	0.5%	0	0%
Germanium	0	0%	5	1.1%	0	0%
Potash	0	0%	8	1.8%	0	0%
Total:			**435**	**100%**		

Appendix II: Summary of Approach Used to Generate a Sample of Currently Operating Universe

This document summarizes the proposed methodology to select a sample of hard rock mining and processing (HRM/P) facilities in the currently operating universe to be further researched and reviewed.

EPA will collect relevant information about releases of hazardous substances for a sample of facilities in the currently operating universe on a sample, or incremental, basis, recognizing that "knowing more" about a smaller sample of these facilities may be more valuable than "knowing less" about all of the facilities. Given the need for a cost-effective and timely data collection effort, EPA has chosen a sample of currently operating facilities across commodity groups, commodities, and facility types that is intended to be generally representative of the entire currently operating universe.

Steps Taken to Select Facilities within the Currently Operating Universe

The methodology for selecting facilities for the sample of currently operating facilities is described as follows:

1. Use the list of 435 currently operating facilities plus a list of 12 currently operating steel mills that use blast furnaces.[645,646]
2. Keep only records for facilities whose operating status (as of October 2014) is "active" (299 facilities). This eliminates facilities whose operating status is "temporarily idled" (46 facilities) or "intermittent operation" (102 facilities).
3. From the subset of 299 facilities, select the number of facilities with a given set of characteristics to include in the sample (with the goal of generating a reasonable final sample size with a wide representation of individual commodities well as facility types for further research) as follows: [647]

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[645] The list of currently operating facilities may change based on periodic updates of these data.

[646] Processors in this list of currently operating facilities have been included based on a definition of processors that is subject to refinement. EPA currently defines "*mineral processing*" as the sequence of activities following extraction and/or beneficiation of metallic or non-fuel non-metallic minerals to: (1) separate and concentrate a target metallic or non-fuel non-metallic mineral from the ore, and (2) to refine ores or mineral concentrates to extract a target metallic or non-fuel non-metallic material. Mineral processing includes the mechanical, thermal, electrical, and/or chemical treatment of naturally occurring earthen materials, either solid or liquid (e.g., rock, ore, mineral or extracted subsurface brine) to recover, purify or create a final mineral product (e.g., dimension stone expanded vermiculite, or refractory clay) or a feedstock of sufficient purity that it can then be used in further industrial or manufacturing operations (e.g., sintered iron pellets, copper concentrates, or phosphoric acid).

[647] This approach focuses primarily on providing a comprehensive sampling of commodities and facility types, rather than geographic locations. It also yields a broad geographic distribution of facilities, however, as shown in Exhibit II.2.

a. If there are two or fewer facilities representing a single commodity / facility type, include the single facility or both facilities in the sample. This ensures that the sample reflects the broadest possible range of site characteristics.

b. If there are fewer than six facilities representing a single commodity, include at least two mines and two processors in the sample. This ensures that the sample reflects a mix of mines and processors across all commodities.

c. For all other commodities / facility types, apply the following rule to select the facilities in the sample: include the larger of three facilities or $\frac{T}{7}$ facilities in the sample, where T is the total number of facilities for a unique commodity / facility type combination. This ensures that the sample more closely reflects the distribution of facilities in the entire currently operating universe.

4. Across each commodity / facility type, select the designated number of facilities from Step 3, subject to the following:

   a. When sampling among "active" facilities, first select facilities on EPA's list of "pilot" sites,648 since certain data have likely already been collected for these facilities.

   b. Next, select among the subset of facilities matched by RTI to the V9 "currently active" list **AND** for which EPA has collected program data (i.e., TRI, DMR[649], National Emissions Inventory [NEI], Biennial Reporting System [BRS] and Total Maximum Daily Load [TMDL] analysis).[650]

   c. Then, select among the remaining facilities (including those that are not on the V9 list).

The above process results in a sample of 111 facilities within the currently operating universe.

Summary of the Proposed Currently Operating Universe Sample

The final sample (111 facilities) represents approximately 25 percent of all facilities in the currently operating universe (447 facilities). Exhibits II.1a. through II.1c. summarize the distribution of facilities within the sample by commodity group, facility type, and commodity and compare it to the distribution of facilities within the entire currently operating universe. Exhibits II.1a. and II.1b. show that each commodity group and facility type is adequately represented within the proposed sample relative to distribution of facilities in the currently

[648] Pilot sites are sites in the non-operating universe for which additional case studies were conducted by RTI, as summarized in the Final Report prepared by RTI entitled, "108(b) Risk Assessment Data Support, Data Collection for Hard Rock Mining Sites," dated December 31, 2010 (RTI WA 1-20, Task 2-1) and in subsequent documents.

[649] Discharge Monitoring Report (DMR)

[650] Based on RTI's data collection under RTI WA 2-19, Task 2, there are 247 V9 sites in the currently operating universe and EPA has collected program data for 234 of these sites (including 197 active sites).

operating universe. As Exhibit II.1c. shows, the proposed sample includes 31 unique commodities and represents a mix of mines and processors. In the proposed sample, several commodities may be over-represented (e.g., alumina, bauxite, lithium, rare earth ores) because of the low total number facilities within these groups. Other commodities may be under-represented (e.g., gold and copper) since the currently operating universe is heavily dominated by these facilities. This decision was made to ensure the proposed sample included a broader range of commodities.

Exhibit II.2. shows the location of facilities in the proposed sample. As the exhibit shows, the proposed sample includes facilities located in 31 states (out of a total of 38 states for the entire currently operating universe). The sample does not include any facilities located in the following states that have mining or processing facilities: West Virginia, South Dakota, Kansas, Mississippi, Nebraska, Illinois, or Alabama.

Overall, the sample includes 91 facilities which are on the V9 list and for which EPA has collected program data. There are also 3 facilities in the sample on the V9 list for which EPA has not collected program data and 17 facilities that are not on the V9 list.

Note that there are eight facilities in the currently operating universe that are pilot sites (or co-located with pilot sites). Of these, seven are included in the sample of currently operating facilities, while one is excluded because its operating status indicates it is an "intermittent operation."

Conclusion

To summarize, this effort (a) collected new data or further supplement existing data for a subset of facilities in the currently operating universe and (b) filled out operational and other information as necessary.

Exhibit II.1a. Summary of Proposed Sample of Currently Operating Facilities by Commodity Group

COMMODITY GROUP	# OF FACILITIES	% OF SAMPLE	% OF TOTAL UNIVERSE
Aluminum	10	9%	5%
Ferrous Metals	9	8%	11%
Industrial Rock	14	13%	6%
Non-Ferrous Metals	58	52%	70%
Phosphates	6	5%	4%
Radioactive Metals	4	4%	3%
Rare Earth Minerals	10	9%	2%
TOTAL	111	100%	100%

Exhibit II.1b. Summary of Proposed Sample of Currently Operating Facilities by Facility Type

FACILITY TYPE	# OF FACILITIES	% OF SAMPLE	% OF TOTAL UNIVERSE
Processing/Refining	47	41.4%	20.6%
Processing/Refining (Blast Furnace)	3	2.7%	2.7%
Surface Mine	34	30.6%	56.8%
Underground Mine	21	18.9%	16.6%
ISL / Solution Mine	3	2.7%	2.5%
Brine Extraction	3	2.7%	0.7%
Solar Evaporation	1	0.9%	0.2%
TOTAL	111	100%	100%

Exhibit II.1c. Summary of Proposed Sample of Currently Operating Facilities by Commodity

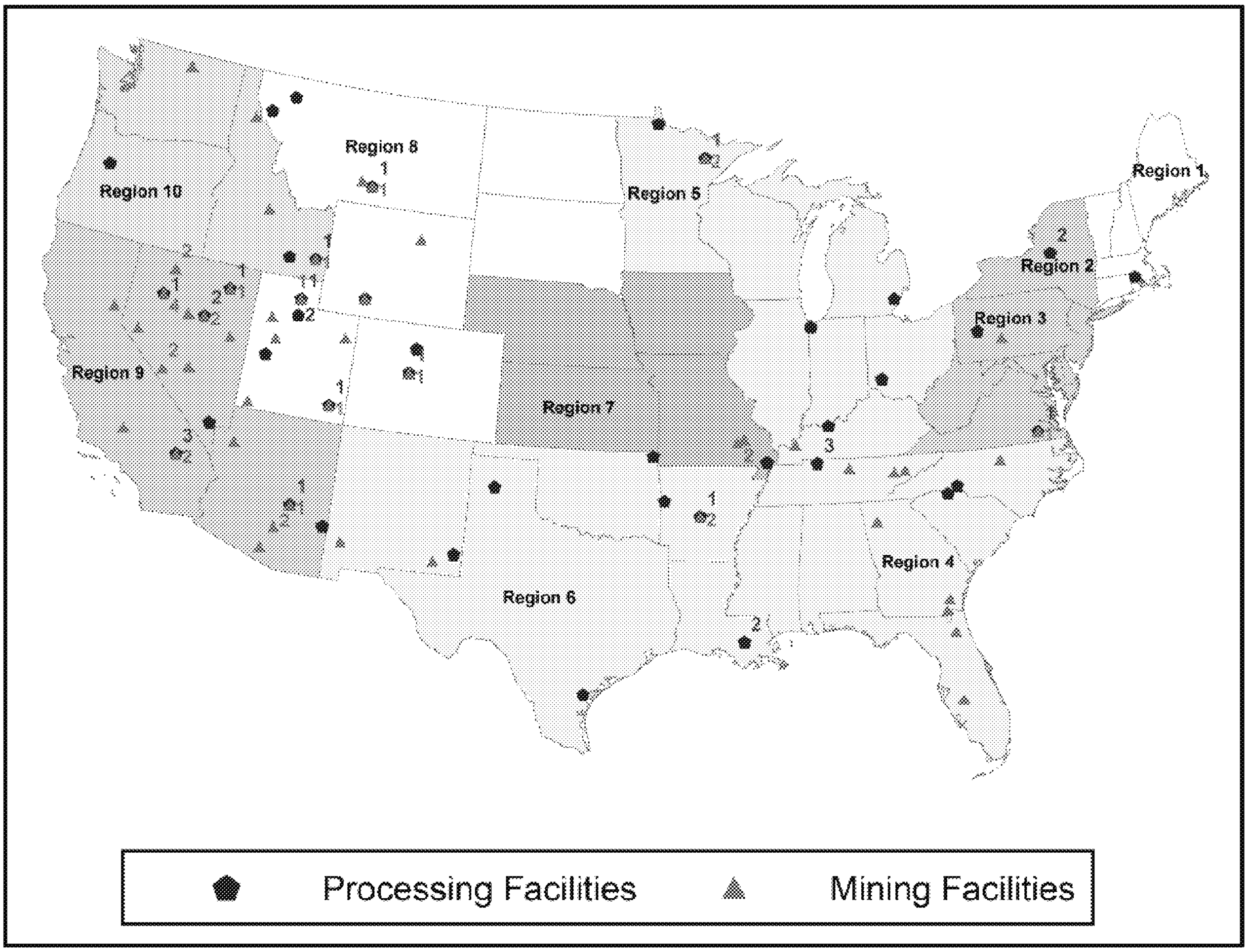
COMMODITY	MINE OR PROCESSOR	# OF FACILITIES	% OF SAMPLE	% OF TOTAL UNIVERSE
Alumina	Processor	2	1.8%	0.9%
Aluminum	Processor	3	2.7%	2.3%
Antimony	Mine	1	0.9%	0.2%
	Processor	2	1.8%	0.5%
Barite Barium Ore	Mine	3	2.7%	2.3%
Bauxite	Mine	3	2.7%	1.1%
	Processor	2	1.8%	0.5%
Beryllium	Mine	1	0.9%	0.2%
	Processor	2	1.8%	0.5%
Boron	Mine	2	1.8%	0.5%
	Processor	3	2.7%	0.7%
Brucite	Mine	1	0.9%	0.2%
	Processor	1	0.9%	0.2%
Cadmium	Processor	1	0.9%	0.2%
Chromite Chromium Ore	Mine	1	0.9%	0.2%
Cobalt	Processor	1	0.9%	0.2%
Copper	Mine	5	4.5%	7.4%
	Processor	3	2.7%	3.7%

COMMODITY	MINE OR PROCESSOR	# OF FACILITIES	% OF SAMPLE	% OF TOTAL UNIVERSE
Fluorspar	Mine	1	0.9%	0.2%
Germanium	Processor	3	2.7%	1.1%
Gold	Mine	10	9.0%	44.1%
	Processor	3	2.7%	2.1%
Indium	Processor	2	1.8%	0.5%
Iron Ore	Mine	3	2.7%	6.2%
	Processor	3	2.7%	2.5%
	Processor/Blast Furnace	3	2.7%	2.8%
Lead-Zinc Ore	Mine	3	2.7%	1.8%
Lithium	Mine	1	0.9%	0.2%
	Processor	1	0.9%	0.2%
Magnesium	Mine	1	0.9%	0.2%
Molybdenum	Mine	3	2.7%	1.6%
	Processor	3	2.7%	1.6%
Phosphate Rock	Mine	3	2.7%	2.5%
	Processor	3	2.7%	1.4%
Platinum Group Ore	Mine	2	1.8%	0.7%
Potash	Mine	3	2.7%	1.6%
	Processor	1	0.9%	0.2%
Rare Earths Ore	Mine	2	1.8%	0.5%
	Processor	1	0.9%	0.5%
Selenium and Tellurium	Processor	1	0.9%	0.2%
Silver Ore	Mine	3	2.7%	1.6%
Titanium	Mine	2	1.8%	0.7%
	Processor	1	0.9%	0.2%
Tungsten[651]	Mine	0	0.0%	0.2%
Uranium	Mine	3	2.7%	2.5%
	Processor	1	0.9%	0.2%
Zinc	Mine	3	2.7%	1.4%
	Processor	1	0.9%	0.2%
Zirconium and	Mine	2	1.8%	0.5%

[651] No tungsten facilities are included in the sample because there are no active facilities in the currently operating universe. The one mine producing this commodity is listed as an intermittent operation.

COMMODITY	MINE OR PROCESSOR	# OF FACILITIES	% OF SAMPLE	% OF TOTAL UNIVERSE
Hafnium	Processor	2	1.8%	0.5%
Sub-total: Mines		62	55.9%	78.9%
Sub-total: Processors		49	44.1%	21.1%
TOTAL		111	100.0%	100.0%

Exhibit II.2. Summary of Proposed Sample of Currently Operating Facilities by Location[652]



[652] The proposed sample includes two Alaska mines that are not shown on the map; the sample of currently operating facilities includes 70 mines and processors, when small mines and placer mining operations are excluded.

Appendix III: Proposed Data Collection Process for Non-Operating Sites and Currently Operating Facilities

As further described below, this effort will first aggregate information from a variety of EPA sources, including data and documentation already collected for CERCLA 108(b), and then supplement this information with data collection from additional sources as time permits. Effort will be made to collect the maximum number of data points within the time allotted. Exhibits III.1. and III.2. describe the proposed data elements for information collection for non-operating sites and currently operating facilities. The data will be aggregated in an Excel Workbook.

Relevant information for the currently operating facilities and non-operating sites will be collected on a sample, or incremental, basis, recognizing that "knowing more" about a smaller sample of these sites may be more valuable than "knowing less" about all of the sites. Appendices III.1 and III.2 include lists of the non-operating and currently operating site/facility samples, for which this effort will collect data.

The proposed data collection process for each site or facility in the sample is as follows:

1. Pull existing data elements from the CERCLA 108(b) comprehensive database and from the Lines of Evidence document, appendices, and supporting databases (dated June 9, 2014).
2. If a particular data point is not available, move on to the next data point. Rely on the existing information, where available.
3. Prioritize the search for information by relying on the following documents, in the following order:

ORDER	NON-OPERATING SITES	CURRENTLY OPERATING FACILITIES
1	ROD documents	Currently operating universe spreadsheet provided by Bill Kline (EPA)
2	RI/FS Data	Envirofacts (BR, CERCLIS, ECHO[653], FRS,[654] ICIS RCRAInfo, TRI)
3	Envirofacts (BR, CERCLIS, ECHO, FRS, Integrated Compliance Information System [ICIS] RCRAInfo, TRI)	ERNS incident reports provided by Bill Kline (EPA)
4	General research and outside sources (*e.g.*, 2012 Earthworks Copper Porphyry Mines report)	Kuipers cost model database
5	N/A	Dun & Bradstreet / Moody's
6	N/A	General research and outside sources (e.g., company websites, news sources)

- For data elements that require further explanation, or for which additional information is available, use comment fields (a column in the Excel worksheet).
- If possible, summarize information across operable units (OUs) at a site/facility.

While effort will be made to populate all of the proposed data fields, for non-operating sites, less emphasis will be placed on the "concentration of hazardous substance released" and "neighboring facilities contributed to the release" data elements.

Exhibit III.1. Proposed Data Elements to Be Collected – Non-Operating Sites

DATA ELEMENTS	PREVIOUSLY COLLECTED FOR SOME SITES	COMMENT	PROPOSED PRIMARY DOCUMENT	DOCUMENTS LIKELY TO CONTAIN PROPOSED DATA ELEMENT INFO
SITE INFORMATION				
Site name	✓		ROD	ROD Summaries
CERCLIS ID	✓		ROD	ROD Summaries
Latitude/longitude	✓	If available.	Envirofacts/FRS	
City, County, State	✓		Envirofacts/FRS	
Operation dates	✓		ROD	

[653] Enforcement and Compliance History Online (ECHO)

[654] Facility Registry System (FRS)

DATA ELEMENTS	PREVIOUSLY COLLECTED FOR SOME SITES	COMMENT	PROPOSED PRIMARY DOCUMENT	DOCUMENTS LIKELY TO CONTAIN PROPOSED DATA ELEMENT INFO
Description of operations	✓		ROD RI/FS	ROD Summaries HRM Site Characteristics Summaries – Minerals and Processes RI/FS Database or CERCLIS-
Commodities	✓		ROD RI/FS	ROD Summaries HRM Site Characteristics Summaries – Minerals and Processes RI/FS Database or CERCLIS
Mine/processor	✓	May be both or may be unknown. This element will have an associated comment field. EPA to provide the current definition of "processor".	ROD	ROD Summaries
If processor, proximity to mine		Does not reflect various methods of transporting materials between mine and processor. This element will have an associated comment field.	ROD	ROD documents, Permit documents, General research
NAICS code	✓	If available. May not be reported in ROD, or may need to be converted from SIC code. This element will have an associated comment field.	ROD RI/FS	ROD Summaries HRM Site Characteristics Summaries – Minerals and Processes RI/FS Database or CERCLIS
If mine, type of mining (open-pit, underground, etc.)	✓		ROD	
REGULATORY STATUS				
Subject to RCRA at time of release	✓	May not be reported in ROD.	ROD	ROD documents, Envirofacts
Subject to CWA at time of release	✓		ROD	ROD documents, Envirofacts
Subject to CAA at time of release			ROD	ROD documents, Envirofacts
Subject to SDWA (UIC program) at time of release			ROD	ROD documents, Envirofacts

DATA ELEMENTS	PREVIOUSLY COLLECTED FOR SOME SITES	COMMENT	PROPOSED PRIMARY DOCUMENT	DOCUMENTS LIKELY TO CONTAIN PROPOSED DATA ELEMENT INFO
Subject to state mining regulations at time of release			ROD	ROD documents, State environmental databases
Under BLM or USFS land use regulations			ROD	ROD documents, BLM LR2000 Land Patents Records
Under other federal oversight (NRC/DOE, etc.)				General research
PROCESS, WASTE MANAGEMENT, AND RELEASE INFORMATION				
CERCLA hazardous substance released	✓		ROD RI/FS	ROD Summaries COC Human Health Risk Summaries COC Eco Risk Summaries RI/FS Database or if needed, CERCLIS EPA Regional Office-
Amount released	✓		ROD RI/FS	ROD Summaries COC Human Health Risk Summaries COC Eco Risk Summaries RI/FS Database or if needed, CERCLIS EPA Regional Office-
Concentration of hazardous substance released	✓	Aggregate the data already available for the non-operating sites in the sample. Do not attempt collection of additional data for "new" sites (unless readily available in the ROD).	ROD	
Media affected (e.g., groundwater, surface water, air, soil, etc.)	✓		ROD RI/FS Baseline Risk Assessment (BRA)	ROD Summaries NPL Mining/Mineral Processing Summary RI/FS database or CERCLIS EPA Regional Office
AMD present?	✓	If specified in the ROD.	ROD	

DATA ELEMENTS	PREVIOUSLY COLLECTED FOR SOME SITES	COMMENT	PROPOSED PRIMARY DOCUMENT	DOCUMENTS LIKELY TO CONTAIN PROPOSED DATA ELEMENT INFO
AMD included in baseline risk assessment?				ROD Summaries Chronology of Major Tailings Dam Failures COC Source Summaries RI/FS database, or CERCLIS EPA Regional Office
Cause of release (inherent to operations, illegal activity, operator error, equipment failure, etc.)		May be difficult to determine. This element will have an associated comment field.	ROD	ROD documents, Administrative docket, RI/FS, General research, ERNS
Release caused by single process/waste management activity, or by multiple activities at the site		May be difficult to determine. A yes/no element, accompanied by a comment field.	ROD	ROD Summaries Chronology of Major Tailings Dam Failures COC Source Summaries RI/FS database, or CERCLIS EPA Regional Office
Cause of release (mining or processing practice(s))	✓		ROD RI/FS	ROD Summaries Chronology of Major Tailings Dam Failures COC Source Summaries RI/FS database, or CERCLIS EPA Regional Office
Cause of release (waste management practice)	✓		ROD RI/FS	ROD Summaries Chronology of Major Tailings Dam Failures COC Source Summaries RI/FS database, or CERCLIS EPA Regional Office
Did neighboring or prior facilities contribute to release?		May be difficult to determine. A yes/no element, accompanied by a comment field.	ROD	ROD Summaries CERCLIS

Exhibit III.2. Proposed Data Elements to Be Collected - Currently Operating Facilities

<table>
<tr><th>DATA ELEMENTS</th><th>POTENTIAL DATA SOURCES</th></tr>
<tr><td colspan="2">Facility Information</td></tr>
<tr><td>Facility Name</td><td rowspan="13">• EPA Data
• EPA Envirofacts
   ○ FRS
   ○ Biennial Report (BR)
   ○ CERCLIS
   ○ TRI
• Dun & Bradstreet
• Moody's</td></tr>
<tr><td>Alternate (Previous) Facility Names</td></tr>
<tr><td>Commodity Group</td></tr>
<tr><td>Commodity</td></tr>
<tr><td>Facility Type (i.e., mine, processor, mine/processor)</td></tr>
<tr><td>City, County, State</td></tr>
<tr><td>NAICS</td></tr>
<tr><td>Current Owner</td></tr>
<tr><td>Previous Owner</td></tr>
<tr><td>Operation Start Date</td></tr>
<tr><td>Historical Overview of the Facility (if available)</td></tr>
<tr><td>Current Mining and Processing Practices</td></tr>
<tr><td>Management of Residuals and Wastes</td></tr>
<tr><td colspan="2">Other Facility Characteristics</td></tr>
<tr><td>Latitude/Longitude</td><td rowspan="9">• Comprehensive Database
• EPA Envirofacts
• Kuipers' Database
• General research

Note: size of nearby population and proximity to sensitive areas data will be incorporated if previously collected and determined, or easily available from source documents. Additional GIS analysis was not conducted.</td></tr>
<tr><td>Site Acreage</td></tr>
<tr><td>Size of Nearby Population</td></tr>
<tr><td>Proximity to Groundwater</td></tr>
<tr><td>Proximity to Surface Waters</td></tr>
<tr><td>Proximity to Sensitive Environments (e.g., FWS approved areas, FEMA special designated areas)</td></tr>
<tr><td>Proximity to Sensitive Aquatic Areas</td></tr>
<tr><td>Contaminant Leaching Potential (low, medium, high)</td></tr>
<tr><td>Other Geological Characteristics (if available)</td></tr>
<tr><td colspan="2">Evidence of Non-permitted Releases (since 1980)</td></tr>
<tr><td>Name of Hazardous Substance</td><td rowspan="5">• ERNS
• EPA RODs
• EPA Envirofacts
• Administrative Docket
• Health impacts data will be collected if readily available in source documents (contextual info.)</td></tr>
<tr><td>Quantity Released</td></tr>
<tr><td>Source/Cause of Release</td></tr>
<tr><td>Medium Affected</td></tr>
<tr><td>Environmental/Health Impacts (if available)</td></tr>
<tr><td colspan="2">Major Enforcement Actions</td></tr>
<tr><td>Major Enforcement Actions</td><td rowspan="2">• EPA Envirofacts
   ○ ECHO Database
• Company Websites
• News Searches
• General Research
EPA will also review NRD data previously collected and determine whether they can be used for this effort.</td></tr>
<tr><td>Agency Responsible for Regulatory Oversight</td></tr>
</table>

Appendix III.A.: Sample of Non-Operating Sites

NO.	SITE NAME	EPA ID	COMMODITY CATEGORIES	OPERATION TYPE
1	Shieldalloy Corp.	NJD002365930	Aluminum & Ferrous Metals & Non-Ferrous Metals	Other
2	Cimarron Mining Corp.	NMD980749378	Ferrous Metals & Non-Ferrous Metals	Other
3	Bueno Mill & Mine Site	CON000802129	Industrial Rocks & Non-Ferrous Metals	Mine
4	Bunker Hill Mining & Metallurgical Complex	IDD048340921	Industrial Rocks & Non-Ferrous Metals	Mine
5	Eagle Zinc Co Div T L Diamond	ILD980606941	Industrial Rocks & Non-Ferrous Metals	Other
6	Captain Jack Mill	COD981551427	Non-Ferrous Metals	Mine
7	Summitville Mine	COD983778432	Non-Ferrous Metals	Mine
8	Gilt Edge Mine	SDD987673985	Non-Ferrous Metals	Mine
9	Upper Tenmile Creek Mining Area	MTSFN7578012	Non-Ferrous Metals	Mine
10	Cyprus Tohono Mine	AZD094524097	Non-Ferrous Metals	Mine
11	Blackbird Mine	IDD980725832	Non-Ferrous Metals	Mine
12	Silver Mountain Mine	WAD980722789	Non-Ferrous Metals	Mine
13	National Zinc Corp.	OKD000829440	Non-Ferrous Metals	Other
14	Tex-Tin Corp.	TXD062113329	Non-Ferrous Metals	Other
15	Omaha Lead	NESFN0703481	Non-Ferrous Metals	Other
16	ASARCO, Inc. (Globe Plant)	COD007063530	Non-Ferrous Metals	Other
17	East Helena Site	MTD006230346	Non-Ferrous Metals	Other
18	Li Tungsten Corp.	NYD986882660	Non-Ferrous Metals	Other
19	Chemet Co.	TND987768546	Non-Ferrous Metals	Other
20	Fields Brook	OHD980614572	Non-Ferrous Metals	Other
21	Coronet Industries	FLD001704741	Phosphates	Mine
22	Eastern Michaud Flats Contamination	IDD984666610	Phosphates	Other

NO.	SITE NAME	EPA ID	COMMODITY CATEGORIES	OPERATION TYPE
23	Monsanto Chemical Co. (Soda Springs Plant)	IDD081830994	Phosphates	Other
24	Stauffer Chemical Co. (Tarpon Springs)	FLD010596013	Phosphates	Other
25	Midnite Mine	WAD980978753	Radioactive Metals	Mine
26	Westlake Landfill OU2	MOD079900932	Radioactive Metals	Mine
27	Homestake Mining Co.	NMD007860935	Radioactive Metals	Other
28	United Nuclear Corp.	NMD030443303	Radioactive Metals	Other
29	Teledyne Wah Chang	ORD050955848	Rare Earth Minerals	Other

Appendix III.B.: Sample of Currently Operating Facilities

NO.	FACILITY NAME	STATE	COMMODITY GROUP	COMMODITY	FACILITY TYPE
1	Noranda Gramercy	LA	Aluminum	Alumina	Processing/Refining
2	Sherwin Alumina	TX	Aluminum	Alumina	Processing/Refining
3	Century Hawesville	KY	Aluminum	Aluminum	Processing/Refining
4	Noranda New Madrid	MO	Aluminum	Aluminum	Processing/Refining
5	Alcoa Mount Holly	SC	Aluminum	Aluminum	Processing/Refining
6	McGeorge Alabama Mine	AR	Aluminum	Bauxite	Surface Mine
7	Saint Gobain Bauxite Calciner	AR	Aluminum	Bauxite	Processing/Refining
8	Saint Gobain Bauxite Mine	AR	Aluminum	Bauxite	Surface Mine
9	Saint Gobain Fort Smith Calciner	AR	Aluminum	Bauxite	Processing/Refining
10	Resco Hillsborough	NC	Aluminum	Bauxite	Surface Mine
11	ArcelorMittal Minorca	MN	Ferrous Metals	Iron Ore	Surface Mine
12	Northshore Mining Silver Bay	MN	Ferrous Metals	Iron Ore	Processing/Refining
13	United Taconite Thunderbird Mine	MN	Ferrous Metals	Iron Ore	Surface Mine
14	US Steel Minntac2	MN	Ferrous Metals	Iron Ore	Processing/Refining
15	Penn Mag	PA	Ferrous Metals	Iron Ore	Processing/Refining
16	CML Iron Mountain2	UT	Ferrous Metals	Iron Ore	Surface Mine
17	New Riverside Ochre	GA	Industrial Rock	Barite Barium Ore	Surface Mine
18	Halliburton Rossi	NV	Industrial Rock	Barite Barium Ore	Surface Mine
19	Nutritional Additives Sexton	NV	Industrial Rock	Barite Barium Ore	Surface Mine
20	Rio Tinto Borax	CA	Industrial Rock	Boron	Surface Mine
21	Searles Valley Minerals Trona1	CA	Industrial Rock	Boron	Brine Extraction
22	Searles Valley Minerals Trona2	CA	Industrial Rock	Boron	Processing/Refining
23	Searles Valley Minerals Westend	CA	Industrial Rock	Boron	Processing/Refining
24	Industrial Minerals Plant2	SC	Industrial Rock	Boron	Processing/Refining
25	Premier Chemicals Gabbs	NV	Industrial Rock	Brucite	Surface Mine
26	Hastie Mining Klondike II	KY	Industrial Rock	Fluorspar	Surface Mine
27	Intrepid Potash East	NM	Industrial Rock	Potash	Underground Mine
28	Great Salt Lake Minerals Ogden	UT	Industrial Rock	Potash	Solar Evaporation
29	Intrepid Moab	UT	Industrial Rock	Potash	Solution Mine
30	Intrepid Potash North	NM	Industrial Rock	Potash	Processing/Refining
31	US Antimony Montana	MT	Non-Ferrous Metals	Antimony	Processing/Refining
32	First Liberty Lovelock	NV	Non-Ferrous Metals	Antimony	Processing/Refining
33	First Liberty Fencemaker	NV	Non-Ferrous Metals	Antimony	Underground Mine
34	KMI Zeolite Shenandoah	NV	Non-Ferrous Metals	Brucite	Processing/Refining

NO.	FACILITY NAME	STATE	COMMODITY GROUP	COMMODITY	FACILITY TYPE
35	Nyrstar Clarksville Cadmium	TN	Non-Ferrous Metals	Cadmium	Processing/Refining
36	PennMag Plant2	PA	Non-Ferrous Metals	Chromite Chromium Ore	Surface Mine
37	Stillwater Columbus	MT	Non-Ferrous Metals	Cobalt	Processing/Refining
38	ASARCO Ray Hayden	AZ	Non-Ferrous Metals	Copper	Processing/Refining
39	ASARCO Ray Hayden	AZ	Non-Ferrous Metals	Copper	Surface Mine
40	ASARCO Silver Bell1	AZ	Non-Ferrous Metals	Copper	Surface Mine
41	Cyprus Tohono	AZ	Non-Ferrous Metals	Copper	Surface Mine
42	Freeport McMoRan Tyrone1	NM	Non-Ferrous Metals	Copper	Surface Mine
43	Robinson Nevada	NV	Non-Ferrous Metals	Copper	Surface Mine
44	Rio Tinto Kennecott Magna1	UT	Non-Ferrous Metals	Copper	Processing/Refining
45	Rio Tinto Kennecott Copperton	UT	Non-Ferrous Metals	Copper	Processing/Refining
46	Indium Germanium	NY	Non-Ferrous Metals	Germanium	Processing/Refining
47	Umicore Germanium	OK	Non-Ferrous Metals	Germanium	Processing/Refining
48	Nyrstar Clarksville Germanium	TN	Non-Ferrous Metals	Germanium	Processing/Refining
49	Coeur Kensington	AK	Non-Ferrous Metals	Gold	Underground Mine
50	Apache Mining Old Wasp Mine	AZ	Non-Ferrous Metals	Gold	Surface Mine
51	Sixteen To One Mine	CA	Non-Ferrous Metals	Gold	Underground Mine
52	Barrick Cortez Underground	NV	Non-Ferrous Metals	Gold	Underground Mine
53	Barrick Goldstrike Mill	NV	Non-Ferrous Metals	Gold	Processing/Refining
54	Barrick Goldstrike Mine	NV	Non-Ferrous Metals	Gold	Surface Mine
55	Florida Canyon Mine	NV	Non-Ferrous Metals	Gold	Surface Mine
56	Geo Nevada Spring Valley	NV	Non-Ferrous Metals	Gold	Surface Mine
57	Newmont Chukar	NV	Non-Ferrous Metals	Gold	Underground Mine
58	Newmont Mill 6	NV	Non-Ferrous Metals	Gold	Processing/Refining
59	Veris Gold Jerritt Canyon	NV	Non-Ferrous Metals	Gold	Processing/Refining
60	Waterton Global Hollister Mine	NV	Non-Ferrous Metals	Gold	Underground Mine

NO.	FACILITY NAME	STATE	COMMODITY GROUP	COMMODITY	FACILITY TYPE
61	Kinross Crown Resources Buckhorn Mine	WA	Non-Ferrous Metals	Gold	Underground Mine
62	Indium New York	NY	Non-Ferrous Metals	Indium	Processing/Refining
63	Umicore Rhode Island	RI	Non-Ferrous Metals	Indium	Processing/Refining
64	Doe Run Buick	MO	Non-Ferrous Metals	Lead-Zinc Ore	Underground Mine
65	Doe Run Fletcher	MO	Non-Ferrous Metals	Lead-Zinc Ore	Underground Mine
66	Doe Run Sweetwater	MO	Non-Ferrous Metals	Lead-Zinc Ore	Underground Mine
67	FMC Bessemer Lithium	NC	Non-Ferrous Metals	Lithium	Processing/Refining
68	Rockwood Lithium	NV	Non-Ferrous Metals	Lithium	Brine Extraction
69	US Magnesium	UT	Non-Ferrous Metals	Magnesium	Brine Extraction
70	Freeport McMoRan Morenci2	AZ	Non-Ferrous Metals	Molybdenum	Processing/Refining
71	Freeport McMoRan ClimaxMoly1	CO	Non-Ferrous Metals	Molybdenum	Underground Mine
72	Freeport McMoRan ClimaxMoly2	CO	Non-Ferrous Metals	Molybdenum	Processing/Refining
73	Freeport McMoRan HendersonMoly2	CO	Non-Ferrous Metals	Molybdenum	Processing/Refining
74	Thompson Creek	ID	Non-Ferrous Metals	Molybdenum	Surface Mine
75	Ashdown	NV	Non-Ferrous Metals	Molybdenum	Underground Mine
76	Stillwater East Boulder	MT	Non-Ferrous Metals	Platinum Group Ore	Underground Mine
77	Stillwater Stillwater	MT	Non-Ferrous Metals	Platinum Group Ore	Underground Mine
78	ASARCO Amarillo-Selenium	TX	Non-Ferrous Metals	Selenium and tellurium	Processing/Refining
79	Hecla Greens Creek Silver	AK	Non-Ferrous Metals	Silver Ore	Underground Mine
80	US Silver Galena	ID	Non-Ferrous Metals	Silver Ore	Underground Mine
81	Coeur Rochester	NV	Non-Ferrous Metals	Silver Ore	Surface Mine
82	DuPont Florida	FL	Non-Ferrous Metals	Titanium	Surface Mine
83	Iluka Resources Concord	VA	Non-Ferrous Metals	Titanium	Surface Mine
84	Iluka Resources Stony Creek	VA	Non-Ferrous Metals	Titanium	Processing/Refining
85	Nyrstar Clarksville	TN	Non-Ferrous Metals	Zinc	Processing/Refining
86	Nyrstar East Tennessee Complex- Coy	TN	Non-Ferrous Metals	Zinc	Underground Mine

NO.	FACILITY NAME	STATE	COMMODITY GROUP	COMMODITY	FACILITY TYPE
87	Nyrstar East Tennessee Complex-Young	TN	Non-Ferrous Metals	Zinc	Underground Mine
88	Nyrstar Middle Tennessee Complex-Elmwood/Gordonsville	TN	Non-Ferrous Metals	Zinc	Underground Mine
89	Monsanto/P4 South Rasmussen-Blackfoot Bridge1	ID	Phosphates	Phosphate Rock	Surface Mine
90	Monsanto/P4 South Rasmussen-Blackfoot Bridge2	ID	Phosphates	Phosphate Rock	Processing/Refining
91	Simplot Don	ID	Phosphates	Phosphate Rock	Processing/Refining
92	Mosaic Uncle Sam	LA	Phosphates	Phosphate Rock	Processing/Refining
93	Simplot Vernal	UT	Phosphates	Phosphate Rock	Surface Mine
94	Mosaic South Pasture Hardee	FL	Phosphates	Phosphate Rock	Surface Mine
95	Energy Fuels Pinenut Mine	AZ	Radioactive Metals	Uranium	Underground Mine
96	Energy Fuels White Mesa Mill	UT	Radioactive Metals	Uranium	Processing/Refining
97	Lost Creek	WY	Radioactive Metals	Uranium	ISL
98	Uranium One Willow Creek	WY	Radioactive Metals	Uranium	ISL
99	Materion Elmore	OH	Rare Earth Minerals	Beryllium	Processing/Refining
100	Materion Delta	UT	Rare Earth Minerals	Beryllium	Processing/Refining
101	Materion Natural Resources Utah	UT	Rare Earth Minerals	Beryllium	Surface Mine
102	Molycorp Mountain Pass1	CA	Rare Earth Minerals	Rare Earths Ore	Surface Mine
103	Molycorp Mountain Pass2	CA	Rare Earth Minerals	Rare Earths Ore	Processing/Refining
104	Columbus Project	NV	Rare Earth Minerals	Rare Earths Ore	Surface Mine
105	Southern Ionics Mission North Mine	GA	Rare Earth Minerals	Zirconium and hafnium	Surface Mine
106	Southern Ionics Mission South Mine	GA	Rare Earth Minerals	Zirconium and hafnium	Surface Mine
107	ATI Wah Chang	OR	Rare Earth Minerals	Zirconium and hafnium	Processing/Refining
108	Western Zirconium	UT	Rare Earth Minerals	Zirconium and hafnium	Processing/Refining
109	AK Steel Middletown	OH	Ferrous Metals	Iron Ore	Blast Furnace
110	ArcelorMittal Indiana Harbor	IN	Ferrous Metals	Iron Ore	Blast Furnace
111	US Steel Great Lakes Ecorse	MI	Ferrous Metals	Iron Ore	Blast Furnace

Appendix IV: Summary of Federal and State Regulations Potentially Applicable to Hardrock Mining and Mineral Processing Facilities

Introduction

Under this task, EPA researched and identified currently applicable federal and state regulations designed to prevent and minimize releases of hazardous substances at hardrock mining and mineral processing facilities. Using both the direct text of laws and regulations and secondary sources, we reviewed environmental regulations to determine their applicability to hardrock mining and mineral processing operations and the extent to which these programs were delegated to states for implementation. Where public information was available, we also noted any pending changes or additions to the regulatory landscape. We reviewed state policies to identify unique regulatory programs at the non-federal level. Given the large number of states, we selected eight states associated with 71 percent of facilities within the currently regulated universe for this round of review.

Tables A through N detail our findings, describing applicable federal and state-level regulations. The following text summarizes the methods and major findings.

Methods

We conducted a literature review of both federal and state-level laws and regulations designed to prevent hazardous releases from hardrock mining and mineral processing facilities. We considered regulations governing preliminary environmental assessment, discharges to water, land reclamation, and solid waste disposal. We also briefly reviewed air regulations and summarize them below, but not in the tables that follow. A future, more detailed review of air regulations can examine the regulatory framework for hazardous air releases.

First, we reviewed federal regulations that potentially apply to hardrock mining and mineral processing. Secondary sources such as academic articles, legal analyses, non-profit and government agency-produced reports, and industry guides provided sources of information on potentially applicable regulations. To confirm information gathered from secondary sources and to supplement our research with the most recently promulgated rules, we reviewed the text of rules promulgated under major environmental laws, as well as the relevant federal agency guidance and notices of ongoing rulemakings. These included: the Federal Land Policy and Management Act, CWA, RCRA, Safe Water Drinking Act, UMTRCA and CAA.

Next, we reviewed state-level regulation for the eight states with the most hardrock mining and mineral processing facilities: Alaska, Arizona, California, Idaho, Minnesota, Montana, Nevada, and Utah. Each of these states includes over 15 facilities within the currently operating universe; together, they include 71 percent of facilities. Upon EPA's direction and in an effort to consider potential regulations for commodities not represented in these eight states, we supplemented our

review by including five additional states: Arkansas, Florida, Indiana, Tennessee, and Texas. Overall, the states we reviewed include over 76 percent of sites within the currently operating universe. Few recent secondary sources discuss regulation at the state level. Thus, for each state, most of our findings are based on direct review of regulations and any applicable state agency guidance. We also considered whether each state managed a delegated federal environmental program, such as water quality permitting.

Findings

On the federal level, landmark environmental laws such as the CWA, SDWA, and CAA form the basis for environmental requirements for HRM/P activities. While some states, such as California, had environmental statutes preceding these federal laws, the passage of major federal environmental laws in the 1970s established a uniform framework for environmental protection in all states. The Environmental Protection Agency (EPA) delegates implementation of CWA, SDWA and CAA programs to most states, with these rules making up a large part of the state-level regulatory framework for hardrock mining.

While the Resource Conversation and Recovery Act (RCRA) generally excludes mining wastes and many processing wastes from its "cradle-to-grave" management framework through the 1980 Bevill Amendment, federal and state agencies have adopted rules regulating hardrock mining and mineral processing under CWA, CAA, and SDWA. Federal toxic substance regulations in the 1990s and 2000s often identified mineral extraction and processing industries as one of the target regulated industries (for example, the CAA National Emissions Standards for Hazardous Air Pollutants (NESHAPs) and CWAELGs).

For issues surrounding solid waste, groundwater quality, and permitting and reclamation on non-federal lands, multiple states have promulgated their own regulatory frameworks for mining operations, which vary widely across the states reviewed. Over time, state mining reclamation laws shifted from focusing on coal mining operations only, to cover metals and ultimately surface mining. All of the initial eight states reviewed (those with the largest numbers of facilities) have enacted surface mining management and reclamation laws. Minnesota was the first to enact a surface mine reclamation requirement for minerals (in 1969), while Arizona was the last (in 1996). Hardrock mining has a much smaller presence in the five additional states reviewed, and we found regulations in these states to be less comprehensive and to focus on specific minerals and commodities rather than broad hardrock mining issues. Of these five states, Arkansas, Tennessee, and Florida regulate surface mining across hardrock commodities. Regulations in Texas focus on coal and uranium operations, while Indiana regulates coal and stone quarry operations at the state level.

Environmental Assessment and Reclamation

Permitting for operations, preliminary environmental assessment, and reclamation requirements attempt to mitigate environmental damages through advanced planning. The BLM and, to a lesser extent, the USFS permit and oversee mining activities on public federal lands. These

agencies are charged with preventing "unnecessary and undue degradation" to public lands, and generally require the submission and approval of plans of operation for proposed activities, including an environmental assessment and reclamation plans. BLM has required reclamation of lands since 1987, and USFS has required reclamation since 1974.

Much of the hardrock mining in the initial eight states reviewed occurs on either federal or state public lands. While BLM and USFS oversee mining activities on federal land, state-level mining regulations in these eight states apply to mining operations on both private and public lands. Many states also maintain memoranda of understanding with the federal government to share responsibility for management of mining on public lands. The level of detail in environmental assessment and reclamation requirements varies in the text of rules and regulations and agency guidance across federal and state regulations. For example, BLM guidance states that particular mining claims may require appropriate mitigation and reclamation measures in plans of operations given anticipated potential environmental impacts, but that generally BLM land use plans do not prohibit certain mining practices through zoning. While some states mirror BLM's management guidance, Montana Code Part 3 (Metal Mine Reclamation) details specific reclamation actions at sites that must be conducted and prohibits certain mining practices. In the past decade, several Congressional bills have been introduced to expand the scope and specificity for environmental performance on federal land, although no legislation has been ratified.[655]

In the five additional states reviewed, state generally did not establish comprehensive regulatory programs for hardrock mining, possibly because of the relatively smaller mineral extraction sectors in these states. For example, Texas has promulgated reclamation standards only for uranium operations. In Indiana, local authorities, rather than state agencies, establish requirements for land use and reclamation.

Water Pollution

Potential releases to water supply constitute a source of concern with respect to hardrock mining and mineral processing operations. The federal CWA authorizes federal regulations to prevent the degradation of water and wetlands in the United States. Generally, NPDES permitting and federal water quality standards, or their EPA-approved state equivalents regulate point-source discharges to water sources from industrial operations. Federal regulation that specifically manages HRM/P operations can be found in the industry-based ELGs under the CWA. The ELGs for ferro-alloy manufacturing, metal mining and processing, and ore mining and dressing point sources lay out maximum effluent limitations based on technology-based standards, and sometimes require NPDES permits for these operations to incorporate certain best management practices.

These rules do not cover all potential sources of water pollution. Mining pits protected by cover do not qualify as point sources from a "discrete conveyance," and do not fall under point-source

[655] Hardrock Mining and Reclamation Acts of 2009 (H.R. 699, S. 796), 2014 (H.R. 5060), amending the General Mining Law of 1872.

requirements under the CWA.[656] Further, some regulatory uncertainty exists regarding how mining overburden, slurry, and tailings are regulated under the CWA, because of different definitions of fill material used by EPA and the USACE. EPA issues and oversees point-source discharge permitting under Section 402 of the CWA, while USACE issues "fill and dredge" permits under Section 404 of the CWA. Thus, Section 404 permits have been issued for mining operations outside of Section 402 NPDES permitting requirements.[657]

Regulations under the federal SDWA and delegated state programs also manage Class III and Class V underground injection wells through permitting and technical standards. Class II wells are used to extract minerals such as copper and uranium through in situ solution mining methods, and Class V wells can be used for solution mining and often serve as on-site disposal systems for mine backfill. Uranium in situ mining and processing is also permitted and managed specifically through NRC regulations.

Waste Disposal

The federal RCRA and delegated state programs exempt mining-related extraction, beneficiation, and 20 mineral processing wastes from Subtitle C hazardous waste requirements. Non-exempt processing wastes, such as emissions control dust and pickle liquor from iron and steel production and spent potliners from aluminum processing, are subject to RCRA's permitting and monitoring requirements. RCRA Land Disposal Restrictions also establish treatment standards for metal and mineral processing wastes exhibiting toxicity characteristics, regulating the disposal of these wastes in underground injection control wells. Nevertheless, most mining waste regulation can be found at the state level. Arizona's Department of Environmental Quality, for example, requires APPs specifically for mine tailing piles and ponds, surface impoundments, and solid waste disposal facilities at mine sites. Nevada water pollution control regulations and California mining waste management regulations each have minimum design criteria and performance standards for the specific management of mining waste.

Releases to Air

While the following tables do not include federal or state regulations designed to prevent hazardous air releases, we briefly summarize them here. Under Section 112 of the CAA, EPA has promulgated NESHAPs for several sources specific to processing operations. These may specify technology-based performance standards, emissions limits, and operational requirements intended to reduce certain air pollutants from processors of certain materials. Several of the states reviewed, including Alaska, Arizona, and Utah, have partially or fully incorporated these standards for delegated implementation. Some states also implement independent air toxics programs, many of which preceded federal NESHAPs. Idaho's Toxic Air Pollutants (TAP)

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[656] *Greater Yellowstone Coalition v. Lewis*, 628 F.3d 1143 (9th Cir. Dec 23, 2010).

[657] C. Copeland, "Controversies over Redefining 'Fill Material' Under the Clean Water Act," *Congressional Research Service* RL31411 (Washington, DC: U.S. Government Printing Office, 2013).

program regulates a larger set of air pollutants than federal NESHAPs, establishing limits of each contaminant for ambient air concentrations or stack-based emissions levels. Nevada's Mercury Control Program, established in 2006, requires mercury emissions controls on thermal units located at gold and silver mines.

Summary Tables

Following this discussion, Tables A through I detail our findings, describing federal and state-level regulations potentially applicable to hardrock mining and mineral processing facilities.

Table A. Federal Laws and Regulations Applicable to Releases from Hardrock Mining and Mineral Processing

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED TO STATES	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
General Environmental Review Requirements						
BLM "3809" regulations – federal surface mining regulations	43 CFR Part 3809	N/A	General	For disturbances of more than five acres on BLM lands, operators must submit a plan of operations, which includes performance standards, mitigation measures, and waste management and reclamation plans. BLM must assess the operation's likely environmental impacts before approving the plan, and can require the operation to conform to BLM's land use plans. BLM land use plans, however, must recognize Mining Law rights, and cannot zone areas to prohibit certain types of mining operations or practices. For operations less than 5 acres, operators must notify BLM and complete reclamations required under previous notices before commencing; BLM approval is not required. BLM can share or defer responsibility for lands management with states through Memoranda of Understanding or Joint Management Agreements.	Preliminary environmental assessment	
Forest Service land management regulations	36 CFR Part 228; Forest Service Manual 2800-2007-2	N/A	General	Forest Service manages mining and its impacts under the standard of the 1897 Organic Act, which grants the Secretary of Agriculture power to promulgate rules to regulate "occupancy and use and to preserve the forests thereon from destruction." It also administers the National Forest Management Act. The "228" regulations require plans of operations for all mechanized mining or exploration operations regardless of acreage if there is significant disturbance of surface resources; the plans may involve a detailed environmental analysis and reclamation plan. Forest Service also requires posting of financial assurance; and establishes performance standards.	Preliminary environmental assessment	
National Environmental Policy Act	P.L. 91-190; 42 USC §4321 et seq	No	General	Requires environmental review process (such as an environmental assessment, or a more extensive environmental impact statement) for actions	Preliminary environmental assessment	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED TO STATES	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
(NEPA)				requiring federal approval. Could be triggered by: • Application for permits for activities on Forest Service land • Approval process for Plans of Operations (which include reclamation plans) for hardrock mining and/or milling operations on federally managed lands (BLM) • Approval of mineral leases and sales on federal or tribal lands or federal mineral estates • Federal permitting processes such as NPDES wastewater discharge permits issued by EPA or Section 404 (dredge and fill) permits issued by USACE or CAA 176(c) permits for non-attainment areas.		
Hardrock Mining and Reclamation Acts of 2009, 2014	HR 699, S. 796 (2009); HR 5060 (2014) [not ratified]	N/A	General	Would amend the General Mining Act of 1872 to expand and make more specific the requirements for environmental performance on federal land. The provisions include: • Increasing acreage of land closed to exploration and development, with input permitted from local governments • Giving land managers the ability to balance mineral activities with other public uses • Establishing mining-specific standards for reclamation, surface and groundwater protection, and ongoing water quality. Regulations would be promulgated to address topsoil replacement, surface stability, sediment prevention, leachate control, vegetative cover, and impoundment design and operation. After operations cease, water quality standards would need to be attained for five years without treatment. • Establishing a reclamation fund from mining royalties Requiring increased inspections, authorizing citizen suits, and proscribing operators currently in violation or with numerous past violations from receiving new permits	Preliminary environmental assessment; Operational Requirements;	Passed the House of Representatives in November 2007, but was not taken up by the Senate, and was re-introduced in the 111th and 113th Congresses. Has not been ratified.

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED TO STATES	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
Media-Specific Regulation						
CAA Section 112 – National Emission Standards for Hazardous Air Pollutants (NESHAPs)	40 CFR Part 63	Partial	Air	• **Ferroalloys production** major sources (64 FR 27450, 5/20/99); area sources (73 FR 78637, 12/23/2008; proposed rule revision 79 FR 60238,10/6/2014) • **Iron and steel foundries** major sources (69 FR 21905, 4/22/04); area sources (73 FR 226, 1/2/2008); • **Primary aluminum reduction plants** (70 FR 66285, 11/2/05; proposed supplemental rulemaking 79 FR 72914, 12/8/14) • PVC and copolymers production, **primary copper smelting**, secondary copper smelting, and **primary nonferrous metals: zinc, cadmium, and beryllium** (72 FR 2930, 1/23/2007) • Aluminum, copper, and other nonferrous foundries area sources (74 FR 30366, 6/25/2009) • Gold mine ore processing and production area sources (76 FR 9449, 2/17/2011) • **Primary lead smelting** major sources (76 FR 70834, 11/15/2011) • **Primary magnesium refining** major sources (68 FR 58615, 10/10/03) • **Taconite iron ore processing** major sources (68 FR 61867, 10/30/03)	Varies by rule. Requirements include:	
CWA Section 401 - state certification	CWA Section 401 (PL-95-217)	Yes	Water	Any applicant for federal licenses or permits (including mining on federal land) may be required to obtain certification from the state that the applicant's discharges into navigable waters will comply with state water quality standards.	Certification	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED TO STATES	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
CWA Section 402 - NPDES permits for point-source discharges	CWA Section 402 (PL-95-217)	Partial	Water	NPDES permits (or state equivalents) required for all point-source discharges, requiring monthly discharge monitoring reports (DMRs).	Permit; Operational requirements; Performance standards	Mining pits protected by cover do not qualify as point sources, and do not fall under this requirement.[658]
CWA Section 402(p) – NPDES stormwater permit	CWA Section 402 (PL-95-217)	Partial	Water	NPDES stormwater permit (or state equivalent) required for stormwater collected into a "discrete conveyance," including construction ditches and stormwater contaminated by contact with material from mining activities. Includes industrial stormwater discharges, including from metal mining.	Permit; Performance standards	
CWA Section 402(p) – NPDES stormwater permit	CWA Section 402 (PL-95-217)	Partial	Water	Discharges from abandoned mines should be subject to NPDES permits where the owners or operators of point sources who are legally responsible for the discharges can be identified. State NPDES programs are responsible for implementing the NPDES permit program with respect to discharges from abandoned mines for which a responsible owner or operator has been identified.	Permit; Performance standards; Operational requirements	
CWA Section 303(c) – Water Quality Standards	40 CFR Part 131	Partial	Water	States and tribes are directed to establish Water Quality Standards (WQS) to support designated uses and prevent degradation. These standards, which must be approved by EPA, support other water regulatory programs, including NPDES permitting. The National Toxics Rule establishes numeric criteria for priority toxic pollutants, by chemical, for 14 states that do not otherwise have similar regulations under Section 303(c)(2)(B) of the CWA.	Performance standards	
CWA Title III - ELGs	40 CFR 424 (ferro-alloy manufacturing); 40 CFR 436 (mineral mining and	No	Water	Mine drainage or process water (but not stormwater) is subject to ELGs.	Technology-based standards; Performance standards; Operational requirements	

[658] *Greater Yellowstone Coalition v. Lewis*, 628 F.3d 1143 (9th Cir. Dec 23, 2010).

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED TO STATES	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
	processing); 40 CFR 440 (ore mining and dressing)					
CWA Section 404 – Dredge-and-Fill permits	33 CFR Part 323	Partial	Water	Permits are required from the USACE for dredge-and-fill activities that discharge into U.S. waters, including mining tailings piles.	Permit	While CWA Section 402 and 404 do not overlap as written, some regulatory uncertainty regarding mining overburden, slurry, and tailings exists because of different definitions of fill material used by EPA and USACE. As such, Section 404 permits have been issued for mining operations that do not have Section 402 NPDES permits.[659]
Rivers and Harbors Act Section 10 - Construction permit	33 CFR Part 322	No	Water	Permits are required from the USACE for construction activities in or over navigable U.S. waters.	Permit	
RCRA Subtitle C Hazardous Waste – Bevill exemption for mining wastes	40 CFR 261.4(b)(7)	Partial	Waste	In general, hazardous waste generators must provide notification, but are not required to obtain permits; hazardous waste management facilities are subject to permitting. Mining-related extraction and beneficiation wastes and 20 special mineral processing wastes, however, are excluded from RCRA Subtitle C by the Bevill Amendment (40 CFR 261.4(b)(7)).[660]	N/A	EPA reported in 1997 that Subtitle C applied on a limited basis to 400 mineral processing sites that may generate characteristic hazardous waste. Only a few mineral processing sites had Subtitle C permits; most

[659] For more information, see C. Copeland, "Controversies over Redefining 'Fill Material' Under the Clean Water Act," *Congressional Research Service* RL31411 (Washington, DC: U.S. Government Printing Office, 2013).

[660] Several Subtitle C provisions are potentially applicable to mining but have not been historically applied (no regulations promulgated). These include:

- Section 2002(a): Authorities of Administrator to prescribe regulations as necessary to fulfill RCRA functions
- Section 3001(b)(3)(B)(iii): Administrator may prescribe regulations to prevent radiation exposure which creates human health risks from the extraction, beneficiation, and processing of phosphate rock or overburden from the mining of uranium ore

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED TO STATES	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
				Although mineral processing wastes are generally excluded from regulation under RCRA Subtitle C, spent potliners from primary aluminum reduction (K088), emission control dust/sludge from the primary production of steel in electric arc furnaces (K061), and spent pickle liquor generated by steel finishing operations at facilities within the iron and steel industry (K062) are regulated as hazardous waste under RCRA.		shipped wastes off-site to avoid Subtitle C requirements.[661]
RCRA Subtitle C Land Disposal Restrictions (LDR)	40 CFR Part 268; 63 FR 28556, 5/26/1998	Partial	Waste	LDR ensure that hazardous waste cannot be placed on land until the waste meets specific treatment standards to reduce the mobility or toxicity of the hazardous constituents. This "Phase IV Rule" finalized treatment standards for several metal wastes and certain newly-identified mineral processing wastes, and revised the universal treatment standards for twelve metal constituents. It applies Universal Treatment Standards (UTS) to newly identified characteristic mineral processing waste. These standards control disposal of certain mineral processing wastes in underground injection control wells. Hazardous waste regulations were modified to define which secondary materials from mineral processing are considered waste, and are thus subject to LDR treatment standards. The rule	Operational requirements	

- Section 3001(b)(3)(C): promulgation of new regulations for Bevill wastes or determination that such regulations are unwarranted
- Section 3004(x): the Administrator is authorized to modify regulations for solid waste from the extraction, beneficiation or processing of ores and minerals, including phosphate rock and overburden from the mining of uranium by taking into account the special characteristics of such wastes

[661] U.S. Environmental Protection Agency, *EPA's National Hardrock Mining Framework* (Washington, DC: U.S. Government Printing Office, 1997), p. C-28. Accessed December 31, 2014, at https://nepis.epa.gov/Exe/ZyNET.exe/91019GVM.TXT?ZyActionD=ZyDocument&Client=EPA&Index=1995+Thru+1999&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C95thru99%5CTxt%5C00000032%5C91019GVM.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=hpfr&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL.

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED TO STATES	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
				eliminates current regulatory distinctions between mineral processing sludges, by-products and spent materials and creates a new class of materials referred to as mineral processing secondary materials eligible for a conditional exclusion from the definition of solid waste. Materials that are legitimately recycled and kept off the land prior to recycling are conditionally excluded. It applies only to primary mineral processing; it makes no changes to the regulatory status of extraction/beneficiation wastes. EPA did not reopen the Bevill determinations. The rule did not alter the regulatory status of listed wastes or wastes from secondary mineral processing facilities.		
SDWA regulations	40 CFR Parts 143-148	Partial	Water	Oversees underground injection wells, which may endanger groundwater supplies. Part 146 describes technical standards for various classes of injection wells. Mining sites must apply for permits for UIC Class 3 wells (wells associated with mineral recovery).	Permit; Operational requirements	
Toxic Substances Control Act – PCB regulations	40 CFR Part 761	No	General	Banned production of equipment containing PCBs. The mining industry has traditionally used high levels of PCBs in transformers and capacitors.	Operational requirements	
NRC uranium mining and processing regulations	10 CFR Part 20; 10 CFR Part 40; Appendix A to 10 CFR Part 40	No	General	Regulates uranium processing and in situ solution mining on public and private lands. Does not regulate traditional (mechanical) uranium ore mining separately from other federal and state agencies. Permitting and regulation of in situ uranium mines. Part 20 establishes standards for protection against radiation, including monitoring and waste disposal. Part 40 establishes domestic licensing of source material. Appendix A to Part 40 promulgates criteria relating to the operation of	Permit; Operational requirements	Pending rulemaking: NRC In Situ Leach Uranium Recovery Facility (ISL) Working Group to revise Appendix A in 10 CFR Part 40 to clarify the regulations related to groundwater protection, and to update the requirements in Appendix A to be consistent with EPA drinking water MCLs.

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED TO STATES	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
				uranium mills and the disposal of tailings or wastes produced from uranium ores.		Another goal is to reduce dual regulation.[662]
UMTRCA	PL 95-604	No	General	Mandates special closure designs for uranium mill tailings ponds to prevent radon gas releases. Under Title I of UMTRCA, the U.S. DOE is responsible for site cleanup and remediation at abandoned uranium and thorium milling sites. NRC is responsible for evaluating the design and implementation of these projects, and for ensuring concurrence with EPA standards.	Operational requirements	
BLM "3809" regulations – federal surface mining regulations	43 CFR Part 3809	Partial	General	Mining operations on BLM land must prevent unnecessary or undue degradation, including by following accepted notices or approved plans of operation, and by following reasonable and customary mineral exploration sequences. Other requirements include proper disposal, concurrent reclamation, and providing for post-mining monitoring, maintenance, and treatment. BLM has required reclamation since 1987. BLM conducts quarterly inspections of operations using cyanide, biannual inspection of other producing operations, and biannual inspection of nonproducing activities that result in disturbance requiring reclamation.	Performance standards; Operational requirements	In November 2000, new 3809 rules defined more specific standards for mine operation, reclamation, and closure and improved federal financial assurance, which previously had been undefined in the 1980 promulgation. They also made it easier for BLM to deny permits for ecological reasons. In 2001, BLM retained a revised form of bonding provisions of the 3809 regulations, but returned the substance of most others to their 1980 form.[663]
Forest Service "228" regulations – federal surface mining regulations	36 CFR Part 228; Forest Service Manual 2800-2007-2	Partial	General	Mining operations on Forest Service land must minimize adverse environmental impacts, including by following approved plans of operation and complying with applicable federal and state laws. Forest Service has required reclamation since 1987, which must be conducted	Performance standards	

[662] "In-Situ Leach Rulemaking," U.S. Nuclear Regulatory Commission. Accessed January 6, 2014, at http://www.nrc.gov/materials/uranium-recovery/regs-guides-comm/isl-rulemaking.html#ri.

[663] A.P. Morriss, R.E. Meiners, and A. Dorchak, "Between a Hard Rock and a Hard Place: Politics, Midnight Regulations, and Mining," *Administrative Law Review* 55:3 (2003), p. 551-606. Accessed December 31, 2014, at: http://www.jstor.org/discover/10.2307/40712239?sid=21105530626993&uid=3739696&uid=2&uid=3739256&uid=4.

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED TO STATES	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
				at the earliest practicable time or within one year of conclusion of operations.		

Table B. Alaska: State-Level Regulations Applicable to Hardrock Mining and Mineral Processing

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
General Environmental Review Requirements						
Mining Reclamation Statute	ALASKA STAT. §§ 27.19 Reclamation; 11 AAC 97.310	No	General	Before starting operations on state, federal, or private lands, the commissioner of natural resources must approve a reclamation plan (27.19.030). Mining facilities in violation of an approved reclamation plan are liable for the full amount of reclamation and administrative costs, and may be subject to suspended or revoked permits for other operations (27.19.070).	Permit; Preliminary environmental assessment	
General Prospecting Permit and Lease Provisions; Alaska Department of Natural Resources (ADNR approval of Plan of operations	11 AAC 86.800	No	General	For operations on state lands, a plan of operations must show how the facility operator will comply with performance standards, stipulations, or conditions applicable to the prospecting permit or lease. The proposed plan of operations must address the areas to be mined, location and design of settling ponds, tailings disposal, overburden storage, permanent or temporary diversions of water, access routes, reclamation plans, and other actions necessary to conduct the operation. Among a list of other tasks the plan must be approved by the Department of Fish and Game, Department of Environmental Conservation, and other applicable agencies.	Preliminary environmental assessment	
Application for Permits to Mine in Alaska (APMA)	ADNR	No	General	APMA is a form for permits required for a range of mining operations, including placer mining. Placer mines may need a Fish Habitat Permit from the Department of Fish and Game. Generally, though, placer mine waste that has not been amalgamated or chemically treated is regulated under the same regulation as other mining waste.	Permit	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
Media-Specific Regulation						
Alaska Pollution Discharge Elimination System (APDES) Permits	18 AAC 15; 18 AAC 83; 18 AAC 72	Yes (2010–present))	Water	Required for any mining operation that is going to discharge wastewater to state waters (point sources). Permits include effluent limits for various pollutants in the wastewater, which comply with Alaska water quality standards. Permits also set monitoring and reporting requirements.	Permit; Performance standards	
Alaska Water Quality Standards	18 AAC 70	Yes	Water	This regulation sets the state standards for water quality, including color, contaminant levels, radioactivity, sediment, and other pollutants (industrial, municipal, agricultural).	Performance standards	
Alaska Pollutant Discharge Elimination System (APDES) Construction General Permit (ACGP)	18 AAC 83	Yes	Water	This permit authorizes stormwater discharges from construction activities that result in a total land disturbance of one acre or less, limits the amounts and types of substances that can be discharged into waters of the state of Alaska, and sets monitoring and reporting mandates to ensure that any discharge leaving a construction project site. The Storm Water Pollution Prevention Plan (SWPPP) describes the design, installation, and maintenance of effective erosion controls, sediment controls, and pollution prevents measures appropriate for each site.	Permit; Performance standards	
Alaska Department of Environmental Conservation (ADEC) Solid Waste Disposal Permit	Title 18 AAC Chapter 60 – Solid Waste Management	No	Waste	This permit and underlying statute are designed to ensure that landfills, treatment facilities, and solid waste storage facilities are designed, built, and operated to minimize health and safety threats, pollution, and nuisances, and to prevent violations of the state air quality and water quality standards. Excluded from regulation are waste rock from mining operations and tailings from placer mining that have not been amalgamated or chemically treated. Other mine tailings are regulated under 18 AAC 60.455, except when the only chemical being used is a	Permit; Operational requirements	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
				flocculent to enhance settling. Tailings from hardrock mines and tailings from placer mines that have been amalgamated or chemically treated are subject to the State solid waste management general standards, requirements, limitations, waste disposal permits, monofill regulations, user fees, and monitoring and corrective action requirements. These permits usually require pre-operational, operational, and post-closure monitoring.		
Alaska land reclamation performance standards	AS 27.19.020; 11 AAC 97.200-240	No	General	Mining operations must be reclaimed to prevent unnecessary degradation of land and water. Reclamation must be conducted as contemporaneously as practicable with the mining operation to leave the site in stable condition. Reclaimed areas should not have a stream flowing over it after reclamation. These standards allow for the reestablishment of renewable resources on the site within "a reasonable period of time by natural processes." The standards require that buildings, structures, and debris on state land be removed. Additionally, these standards require operators to seal all openings of underground mines for protection of public, wildlife, and environment. Heap leach operations require neutralization and approval by the appropriate regulatory authority (EPA/DEC). These standards require the site to be reclaimed to standards of AS 27.19. The standards require that mined areas be reclaimed if there is potential to generate AMD to prevent discharge/generation of AMD.	Operational requirements	

Table C. Arizona: State-Level Regulations Applicable to Hardrock Mining and Mineral Processing

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
General Environmental Review Requirements						
Mineral Leases Authorization for Locatable Minerals	ARS §27-231 through 27-256	No	General	For state lands, a Mineral Development Report must be submitted with the mineral lease application, including an environmental assessment, biological evaluation, and mine operation, reclamation, and closure plans. The lessee must receive authorization in the form of approved Mine Operation and Reclamation and Closure Plans.	Preliminary environmental assessment	
Mined Land Reclamation Plan; Aggregate Mined Land Reclamation Plan	ARS §27-901 et seq. and 27-1201 et seq.; AAC R11-2-101 through R11-2-822	No	General	The Reclamation Plan or the Aggregate Mined Land Reclamation must be submitted and approved for all metal mining units and exploration operations with surface disturbances on private lands greater than five acres. Plan provides measures for: revegetation, financial assurance, topsoil requirements, erosion control, and waste removal. The Office of the Arizona State Mine Inspector administers the Arizona Mined Land Reclamation Act (AMLRA) (passed in 1994), and the implementing regulations (promulgated in 1997). Metal processing facilities are exempt, as are surface disturbances on state lands.	Permit; Preliminary environmental assessment	
Media-Specific Regulation						
APP	ARS §§49-241 through 49-252; AAC R18-9-101 through R18-9-403	No	Water	Arizona DEQ regulates discharges from mining operations under the Aquifer Protection Program. A variety of facility types listed under Arizona law as categorical discharging facilities must obtain an	Permit; Technology-based standards; Performance standards	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
				APP. Specific to mining, these facilities include: mine tailing piles and ponds, surface impoundments, solid waste disposal facilities at mine sites, mine leaching operations, wetlands associated with mine water treatment; and injection wells (such as those found in in situ copper leach operations). The applicant must show that the best demonstrated control technology will be used by the facility, and that Aquifer Water Quality Standards (AWQS) will not be exceeded. Dry wells must be registered with ADEQ, to minimize groundwater impacts and ensure that only stormwater enters a dry well. Closure of dry wells must follow ADEQ's Dry Well Decommissioning Guidelines. Exempt sites include mining overburden returned to the excavation site including any common material which has been excavated and removed from the excavation site and has not been subjected to any chemical or leaching agent or process of any kind.		
Arizona Department of Water Resources (ADWR) Withdrawal and Use of Groundwater Permit	ARS §45	No	Water	When mines are included in the five active management areas for groundwater, management plans include conservation requirements to: regulate transport tailings density, reduce water loss from tailings impoundments, minimize water use in leaching processes, and prepare a long-range conservation plan.	Operational standards	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
Arizona Pollutant Discharge Elimination System (AZPDES) permits	ARS §255.01; 18 AAC 9, Article 9	Yes	Water	The State of Arizona enforces its own version of NPDES: the AZPDES. ADEQ issues individual permits tailored for specific facilities based on individual applications, and general permits for multiple facilities within a specific category, industry, or area. Permits include effluent limitations, based on technology and water quality standards, and monitoring or reporting requirements to evaluate wastewater treatment efficiency. As part of the Industrial Stormwater Program, ADEQ requires all mining facilities on non-tribal lands to obtain the AZPDES Multi-sector General Permit (referred to as an "AZPDES MSGP 2010 permit" for mining). Must submit a SWPPP. A permit is required unless discharges from conveyances used for collecting precipitation runoff from mining operations are composed entirely of non-contact stormwater uncontaminated by mining operations. Mining facilities are generally required to obtain a point-source discharge permit for mine drainage.	Permit; Performance standards, technology-based standards	
Arizona Water Quality Standards For Surface Waters	AAC 18-11	Yes	Water	The Arizona Water Quality Standards for surface waters describe designated uses, anti-degradation requirements, narrative water quality standards, numeric water quality standards/targets, discharge prohibitions, and drinking water standards. It also provides standard levels by substance type and discharge prohibitions.	Performance standards; Technology-based standards	

Table D. Arkansas: State-level Laws and Regulations Applicable to Releases from Hardrock Mining and Mineral Processing

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
General Environmental Review Requirements						
Open-cut and In-stream Mine Permits – general and individual	Arkansas Act 827 of 1991; Arkansas Pollution Control and Ecology Commission Regulation No. 15.301 – 15.313	No	General	Permits are required for all open-cut and in-stream mining. Permit application includes maps of the region with descriptions of water flow patterns, mining plans with descriptions of release mitigation and topsoil preservation measures, and reclamation plans. Permit terms shall not exceed five years. For in-stream mines, the mining plan must include storm and process water containment, map of permit area, and a stream cross section. Groups of mines can apply for a general permit if they are similar in nature and if they, separately or together, would only have minimal impacts on the environment.	Preliminary environmental assessment; Permit	
Quarry permit	Arkansas Act 1166 of 1997	No	General	Applies to all new quarries or land purchased for quarry after 1997. Facilities must submit a notification of intent to quarry, including area boundaries, a map of operations and topographic characteristics, and a notice of intent to reclaim the area afterwards. After notification, facilities are allowed to quarry indefinitely unless the Arkansas Department of Environmental Quality (DEQ) issues a temporary cessation due to environmental or health reasons.	Permit; Operational requirements; Performance standards	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
Media-Specific Regulation						
Open-cut mine standards	Arkansas Act 827 of 1991; Arkansas Pollution Control and Ecology Commission Regulation No. 15.401 and 15.402	No	General	Open-cut mines are subject to requirements surrounding slope of piles, dam construction, reclamation, maintenance of vegetative cover, and buffer zones between the mine and adjacent waterways. Mines must submit an annual report to Arkansas DEQ. Lakes left as part of reclamation must remain within a pH of 6 and 9 unless otherwise allowed. Arkansas DEQ must approve the disposal method for mine spoil.	Operational requirements; Performance standards	
In-stream mining standards	Arkansas Act 827 of 1991; Arkansas Pollution Control and Ecology Commission Regulation No. 15.401 and 15.403	No	General	In-stream mines must ensure that material removal remains below the high water mark, that they do not violate any of the state's water laws, and that removal does not alter stream course or create channel instability. In-stream mines are required to reclaim areas to prevent erosion and ensure bank stability. Mining in streams designated as "extraordinary resource waters" is not allowed.	Operational requirements; Performance standards	
Quarry standards	Arkansas Act 1166 of 1997	No	General	After completion of quarrying activities, companies are required to reclaim the land to at least a lake, pasture, timberland, wetland, or combination thereof. Alternatively, a comparable amount of other post-reclaimed land can be left. Topsoil and spoil should be stockpiled and returned to site. Stormwater and process water are regulated under the operator's stormwater pollution prevention plan and NPDES permit, respectively.	Permit; Operational requirements; Performance standards	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
Arkansas NPDES individual permits	Arkansas Pollution Control and Ecology Commission Regulation No. 6.202	Yes	Water	ADEQ has the responsibility to issue NPDES permits. All persons who construct, operate, or modify any disposal system that discharges industrial wastes or other wastes into state waters shall apply for a state permit. Facilities are subject to standards set out by the "Recommended Standards for Sewage Works," published by the Great Lakes-Upper Mississippi Board of State Sanitary Engineers. All discharges of wastewater in the Lake Maumelle Basin are prohibited, except for NPDES stormwater discharges.	Permit; Operational requirements; Performance standards	
NPDES stormwater permit for industrial facilities (ARR000000)	Arkansas Water Pollution Control Act; Arkansas Pollution Control and Ecology Commission Regulation No. 6	Yes	Water	Stormwater discharges from industrial sites are granted an NPDES general permit, currently in effect until 2019, provided that sites meet certain criteria. The permit is available for discharges from primary metals, metal mining, and mineral mining and dressing sectors. Requirements include the following: • Each facility must prepare a SWPPP, which includes a description of the facility, description of potential sources of pollution, mitigation measures, and other requirements. • Required management practices include minimizing exposure of potential pollutant sources to rain, snowmelt, and runoff, regularly maintaining equipment, implementing certain spill prevention and response measures,	Operational requirements; Performance standards	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
				implementing erosion and sediment controls, and managing runoff. • Facilities are required to monitor stormwater once per year for a wide range of contaminants, including a wide range of metals. The concentrations of these contaminants should be compared against certain "benchmark" concentrations to assess the effectiveness of BMPs, although exceeding these does not count as a permit violation.		
NPDES stormwater permit for construction facilities (ARR00A000)	Arkansas Water Pollution Control Act; Arkansas Pollution Control and Ecology Commission Regulation No. 6.203	Yes	Water	Stormwater discharges from construction sites are granted an NPDES general permit, currently in effect until 2016, provided that sites meet certain criteria and provide a Stormwater Pollution Prevention Plan. BMPs include erosion controls, soil stabilization, pollution prevention, and dewatering. Sites must not cause a violation of state or federal water quality standards.	Operational requirements	
Arkansas water quality standards	Arkansas Pollution Control and Ecology Commission Regulation No. 2	Partial	Water	The Arkansas Pollution Control and Ecology Commission adopts standards for the state to protect designated uses of water. Includes standards for minerals, bacteria, clarity, temperature, oil and grease, acidity or alkalinity, dissolved oxygen, nutrients, and toxic substances, and other factors.	Performance standards	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
Arkansas Pollution Control and Ecology Commission Regulation No. 23; Arkansas Hazardous Waste Management Act	Ark. Code, Ann Sects. 8-7-202 et seq; Arkansas Pollution Control and Ecology Commission Regulation No. 23	Yes	Waste	Arkansas DEQ implements RCRA Subtitle C, as well as its own Arkansas Hazardous Waste Management Act. The Arkansas law includes several standards that Arkansas identifies as more stringent than the federal law. • Mining and mineral processing waste is only considered hazardous if it is mixed with other solid wastes defined by Arkansas as hazardous and if contaminant concentrations in the mixture exceed certain maximum levels, and would not have been exceeded solely by mining waste alone. • An impermeable coating is required for drip pads (264.571(b)) and all surfaces of the secondary containment structure for container storage areas.(264.175(b)(2))	Permit; Operational requirements	
Arkansas Hazardous Waste Regulations	40 CFR Part 26; Arkansas Pollution Control and Ecology Commission Regulation No. 23	Yes	Waste	Arkansas is currently authorized to implement the RCRA Subtitle C base program. Although mineral processing wastes are generally excluded from regulation under RCRA Subtitle C, spent potliners from primary aluminum reduction (K088), emission control dust/sludge from the primary production of steel in electric arc furnaces (K061), and spent pickle liquor generated by steel finishing operations at facilities within the iron and steel industry (K062) are regulated as hazardous waste under RCRA and delegated state programs.	Permit; Performance standards; Operational requirements	

Table E. California: State-Level Regulations applicable to Hardrock Mining and Mineral Processing

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
General Environmental Review Requirements						
Surface Mining and Reclamation Act (SMARA) reclamation plan and assessment	14 CCR § 2.8.1	No	General	Individual county and city governments issue and enforce all mining permits in California. Applies to surface mining operations on state, federal, private, or Indian land disturbing more than 1 acre or removing more than 1,000 cubic yards of materials. The Act passed in 1975. Requires a reclamation plan, which includes California Environmental Quality Act (CEQA) slope stability, vegetation, and groundwater studies, an erosion control plan, compliance with a range of environmental laws, topographic maps, mining and reclamation phasing maps, a biological survey, and settling pond and spillway designs.	Permit; Preliminary environmental assessment	
CEQA	14 CCR 6.3 § 15000-15387	No	General	Applies to discretionary projects made by California state agencies, including the issuance of permits. Requires a Preliminary Review to determine significance and an Environmental Impact Report if the action is found to be significant. Includes review guidelines particular to surface mining. Agencies cannot approve projects if feasible alternatives exist that substantially lessen their significant environmental impacts.	Preliminary environmental assessment	
MOU between the California Surface Mining and Geology	"Surface mining and reclamation	No	General	Establishes how these agencies will work cooperatively in order to meet all of the requirements of	Preliminary environmental assessment	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
Board (SMGB), U.S. Department of the Interior (DOI), and the USFS	coordination in the State of California," 1992			federal, state, and local laws, particularly California's Surface Mining and Reclamation Act.		
Media-Specific Regulation						
SMARA reclamation standards	14 CCR Div. 2.8.1 §3700	No	General	Mining operations must practice environmental impact mitigation and reclamation as specified in their operating permits. These codified standards represent minimum reclamation that must be conducted. Permitting agencies can incorporate more stringent requirements on a site-specific basis. Minimum reclamation standards incorporate land stability, recontouring, revegetation, soil quality, and water quality maintenance.	Performance standards; Operational requirements	
Porter-Cologne Water Quality Control Act; State Water Resources Control Board Mining Waste Management Regulations	27 CCR Div. 7.1	No	Waste; Water	All mining units (including surface impoundments, waste piles, and tailings ponds) subject to Waste Discharge Requirements (WDRs) must comply with the siting and construction standards. Mining wastes are classified into three groups (A, B, and C) based on their potential hazard to water, including their acid-generating potential. Disposal and management regulations are based, to an extent, on these hazard groups. The law establishes monitoring, siting and construction, and closure standards for mining units. Operators must have a closure and post closure maintenance plan. Waste units	Technology-based standards; Performance standards; Operational requirements	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
				must still comply with performance standards based on their hazard group.		
Porter-Cologne Water Quality Control Act; Regional water quality boards permitting and water quality standards	27 CCR Div. 4	Yes	Water	Water quality standards are established at the sub-state level by nine regional water quality boards, based on local needs and hydrological conditions. These local boards issue permits and take enforcement actions. Regional water boards may issue discharge standards specifically for mine waste.	Permit; Performance standards	
Regional Water Quality Control Boards - NPDES program (Waste Discharge Requirements)	27 CCR Div, 4.4	Yes	Water	California's nine Regional Water Quality Control Boards issue NPDES permits, also referred to as Waste Discharge Requirements, to regulate the discharge of municipal wastewater or industrial process, cleaning, or cooling wastewaters, commercial wastewater, treated groundwater from cleanup projects, or other wastes to surface waters only. If the waste discharge consists only of non-process stormwater, it may be regulated under the NPDES Stormwater program. The discharge of waste to the ground surface or to groundwater is regulated under the Non-Chapter 15 Permitting, Surveillance, and Enforcement Program.	Permit; Performance standards; Technology-based standards	
California Hazardous Waste Regulations	22 CCR Div. 4.5 §66261	No	Waste	Mining overburden and mining wastes are excluded from classification under RCRA, but may be regulated as hazardous wastes in California if they exhibit characteristics listed in Chapter 11, Article 3, §66261.	Permit; Operating requirements	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
				California's hazardous waste management system establishes permitting procedures and operating requirements for generators and transporters of hazardous waste, as well as hazardous waste management facilities.		

Table F. Florida: State-Level Regulations Applicable to Hardrock Mining and Mineral Processing

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
General Environmental Review Requirements						
Florida Department of Environmental Protection (FDEP) Mandatory Nonphosphate Program	62-343 FAC; 62-671 FAC; 62C-16 FAC; 378.101 FS, 378.102 FS	No	Water	This program, administered by FDEP, regulates heavy minerals, fuller's earth, limestone, dolomite and shell gravel and other solid resources. It consists of two permitting programs and a post-mining reclamation program. These programs cover heavy minerals, but exclude phosphate. The wetland resource permit (WRP) program requires wetland resource permits for the Northwest Florida Water Management District for operations in state wetlands and surface waters, or wetlands and surface waters with multiple owners. Operations regulated under this program include dredging, filling, and construction. In other parts of the state, environmental resource permits (ERPs) are required for the creation or alteration of water bodies including old mine pits. ERPs consider an operation's impact on wetlands, water quality and quantity, and wildlife. The ERP combines the authority of water management districts under the management and storage of surface waters (MSSW) program with the regulatory authority of FDEP under the wetland resource permit program.	Permit; Performance standards	There are 67 counties and approximately 390 municipalities that may regulate activities at mines at the local level. The aspects regulated and the degree of the regulation differ for each local government. Local regulation may include: conformance with the Comprehensive Land Use Plan, impacts to wetlands, operating permits, reclamation, setbacks from property lines, stormwater management, truck routes, noise, performance bonding, garbage disposal, etc.
Developments of Regional Impact (DRI) Process	380.06 FS	No	General	The DRI process is a comprehensive review of state law, conservation of plant and wildlife resources, and impacts to: archaeological and historical resources, hazardous material usage, potable water, wastewater, and solid waste, transportation, air quality, and housing, including affordable housing. This program provides state and	Preliminary environmental assessment	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
				regional review of large developments, including any solid mineral mining operation which is expected to disturb more than 100 acres per year, or which consumes more than three million gallons of water per day. Additionally, mines that will be reclaimed to large residential, commercial, or industrial areas are considered DRI.		
Media-Specific Regulation						
Florida Water Quality Standards	62-302 FAC	Yes	Water	FDEP reviews, establishes, and revises the state water quality standards. The Florida Water Quality standards describe classifications of water bodies, general and cite specific criteria, an anti-degradation policy, and special protection of Outstanding Florida Waters (OFW). FDEP is currently developing biological and numeric nutrient criteria.	Performance standards	
FDEP Wetland Resource (WR) Permit	62-312 FAC	No	Water	In certain Water Management Districts, operations in, on, or over, wetlands or surface waters require WR permits. Florida Administrative Code 62-312 establishes a method to consider hydric soils, wetland plants, and hydrologic indicators to identify the limits of wetlands and surface water. The WR permit regulates dredging, filling, and construction. In water districts other than the Northwest Florida Water Management District, the Wetland Resource Permit sets stormwater standards.	Permit; Operational requirements	
FDEP ERP	62-343 FAC	No		Covers operations in, on, or over wetlands and surface water in Water Management Districts not regulated by WR permits. It does not apply to mines in the Northwest Florida Water Management District. All mines except for borrow pits without on-site sorting	Permit; Operational requirements	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
				or grading apply for an ERP through the FDEP. Some mines may still be grandfathered from the ERP, and may use the MSSW and/or Wetland Resource permits. In most cases, these are mines with existing permits or formal wetland delineation determinations.		
FDEP Stormwater Discharge Program	62-25 FAC	Partial	Water	This FDEP program implements NPDES stormwater standards for facilities that discharge pollutants associated with fugitive dust or contain outdoor storage of raw materials and byproducts. If a facility is not also required to have a NPDES wastewater permit, then EPA Region 4 administers the permit. This program regulates operations in the Northwest Florida Water Management District only. In other Water Management districts, stormwater standards are included in Wetland Resource Permits.	Permit; Operational requirements	
FDEP Industrial Wastewater (IW) Permit Program	62-4 FAC	Yes	Water	These permits regulate point-source water and industrial discharges, and can incorporate federal NPDES wastewater and stormwater permit standards, including ELGs. Industrial categories covered include phosphate mining and beneficiation, ore mining and dressing, and phosphate manufacturing. General IW Permits are registered to operations that can contain process wastewater and runoff from up to a 25-year, 24-hour storm event. Individual IW permits are required for operations that exceed this level. Industrial wastewater permits are issued by the district offices, with two exceptions. NPDES permits for steam electric power plants are issued by the Industrial	Permit; Performance standards	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
				Wastewater Section. Some mining operations may be exempt from these permits. Industrial wastewater permitting for the phosphate industry is handled by the state Phosphogypsum Management Section.		
FDEP, USACE Dam Safety Program	373 FS; 62-672 FAC	No	Water	The dam safety program is regulated through statute Chapter 373 Water Resources, the Phosphate Management Rule 62-672, which contains operational requirements (such as water level and vegetation requirements) for active and retired dams, and the best management practices for non-clay, phosphate mining and reclamation berms and impoundments. FDEP inspects dams for phosphate mining and other industrial operations. In addition to FDEP and USACE, the Dam Safety program is administered by regional water management districts.	Operational requirements	
FDEP Mandatory Phosphate Program (MANPHO)	378.101 FS, 378.102 FS, 373.403-373.468 FS; 62C-16 FAC, 62-312 FAC, 62-4 FAC, 62-343 FAC, 62-341 FAC, and 40X-4 FAC,	No	General	This program administers the rules related to the reclamation of lands mined for phosphate after 1975. It also administers the rules related to Environmental and Wetland Resource Permits for phosphate mined lands. Reclamation requirements include water quantity impact analysis and best available technology consideration. Reclamation standards include safely contoured slopes, acceptable water quality and quantity, revegetation, waste management, and return of wetlands to premining state. Concurrent reclamation is not explicitly required, but the regulations establish completion dates for various reclamation activities ranging from six months to two years.	Performance standards; Operational requirements	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
Phosphogypsum Management	62-673	No	Water	This rule regulates phosphogypsum stack systems. It establishes procedures and permitting requirements and sets operational and closure standards for these systems.	Permit; Operational requirements	
Phosphate Mining Waste Treatment Requirements	62-671	Yes	Water	The phosphate mining waste treatment requirements adopt federal effluent limitations and new source requirements for mining and processing of phosphate bearing minerals.	Operational requirements; Performance standards	

Table G. Idaho: State-Level Regulations Applicable to Hardrock Mining and Mineral Processing

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
General Environmental Review Requirements						
Idaho Surface Mining Act; Department of Lands Reclamation Plan Approval	Idaho Code 47-15	No	General	Surface mining on private, state, or federal land requires an approved reclamation plan. Depending on the project size, the plan can be for concurrent reclamation, or after operations close. Reclamation should replace topsoil and stabilize vegetation. Each approved reclamation plan must have a performance bond; exploration using motorized earth moving equipment requires a notice; water quality must be maintained and affected lands and disturbed watercourses must be reclaimed. State is allowed to administer penalties for violation of the Act. Act does not apply to placer, dredge, or underground mining.	Preliminary environmental assessment	
Idaho Rules for Ore Processing by Cyanidation	IDAPA 58.01.13	No	Water	These rules regulate the procedures and requirements for permitting of cyanidation facilities, in order to safely contain, control and treat water associated with the cyanidation process. The rules cover construction, operation, and closure. Permit applications require environmental and risk management reviews.	Permit; Operational requirements	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
Idaho Dam Safety Program	Idaho Code 42-17; IDAPA 37.06.06; IDAPA 37.03.05	No	General	The dam safety program regulates dams through dam safety statutes and rules, and mine tailings impoundment structures rules. Mine tailings impoundment structures are any artificial embankment that is or will be more than 30 feet in height measured from the lowest elevation of the downstream toe to the maximum crest elevation, constructed for the purpose of storing mine tailings slurry (I.C. 42-1711). The Safety of Dams Statute was amended in 1978 to include regulation of mine tailings structures. IDEQ oversees the construction, enlargement, alteration, repair, operation, maintenance, and removal of dams. Owners of dams that are taller than 20 feet must file an application with plans and specifications prepared by a consultant to conform to IDEQ's safety standards. Owners of mine tailings impoundment structures must provide a surety bond payable to the Idaho Department of water quality for reclamation of the facility.	Permit	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
Media-Specific Regulation						
Department of Water Resources Dredge Mining permit	Idaho Code 47-1322 ; IDAPA 20.03.01	No	General	Any placer mining operation that disturbs more than one half of an acre of land (private, state, or federal) is required to have a permit from the Idaho Department of Lands (IDL). Every permit requires a performance bond. Permits require that operators maintain water quality, through implementation of best management practices (including the development of nonpoint sediment control practices), and disturbed lands and watercourses must be reclaimed. Reclamation requires backfilling, grading, topsoil replacement, and vegetation. Among other requirements, potential water quality impact documentation is required. A reclamation plan is part of the permit approval process. IDL is required by the Dredge and Placer Mining Act to inspect operations periodically to review compliance with permits.	Permit	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
Water Quality Standards	IDAPA 58.01.02	Yes	Water	Idaho DEQ is responsible for adopting and enforcing water quality standards that protect beneficial uses for the Idaho Water Quality Standards. EPA develops recommended criteria, regulations, policies, and guidance to help Idaho implement the Water Quality Standards Program and to ensure that Idaho's adopted standards are consistent with the requirements of the CWA and relevant regulations. Additionally, EPA has authority to review state standards and to promulgate federal water quality rules, if it finds the state is not meeting the requirements of the CWA. NPDES permits in Idaho for discharges, however, are administered by the EPA at the federal level.	Performance standards	
Department of Lands reclamation requirements	Idaho Code 47-15	No	General	Establishes specific reclamation requirements for every operator who conducts exploration or surface mining operations that disturb two or more acres within the state. Requirements include sediment control, clearing and grubbing limits, salvage of topsoil and overburden for later reclamation, road construction and rehabilitation, backfilling and grading at closure, waste disposal and protection from erosion and chemical impact, settling pond criteria, tailing impoundment criteria and rehabilitation, revegetation of disturbed areas. The Department of Lands conducts	Operational requirements	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
				Inspections to review compliance with approved reclamation plan.		
Idaho Rules for Ore Processing	IDAPA 58.91.13	No	Water	This rule requires that, before disposal or abandonment of leached ore, concentrations of WAD cyanide or free cyanide and other pollutants in process-contaminated water draining from the leached ore must be reduced to a level set by the permit writer based on disposal method, location, and potential for surface water and groundwater contamination or have a pH of between 6.5 and 9 (stabilized).	Operational requirements	
Idaho Small Suction Dredge Mining General Permit (NPDES general permit)		No	Water	EPA issued an NPDES general permit requirement in 2013 for small suction dredge operations in Idaho. Operators of small suction dredges must obtain NPDES permit coverage before operation. The general permit covers small suction dredges with an intake nozzle size of five inches in diameter or less and with equipment rated at 15 horsepower or less. The general permit places conditions on the discharge of rock and sand from each mining operation to protect water quality and aquatic resources. These conditions include best management practices and prohibited discharge areas.	Permit; Operational requirements	

Table H. Indiana: State-Level Regulations Applicable to Hardrock Mining and Mineral Processing

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
General Environmental Review Requirements						
Mining Permits	Indiana Code 14-35-1-1	No	General	The state has statutory authority to grant permits for extraction, removal, and disposition of minerals on or under land or non-navigable waters. The Indiana Department of Natural Resources (IDNR) does not comprehensively regulate non-coal mining operations, however. Generally, local entities regulate mining of dimension limestone, peat, marl, gypsum, sand, gravel, and crushed stone through local land use regulations.	N/A	
Media-Specific Regulation						
Water Quality Standards	Article 2. Water Quality Standards; 327 IAC 2	Yes	Water	This regulation sets surface and groundwater standards for a list of minimum water quality standard parameters. It also requires operations that produce cyanides and cyanogen compounds to not drain these substances directly or indirectly into any sewer system or watercourse. Water treatment control facilities are required to submit monthly reports, regarding flow measurements and wastewater characteristics to the Indiana Department of Environmental Management (IDEM).	Performance standards; Permit	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
NPDES Program	327 IAC 15	Yes	Water	IDEM administers the NPDES program for the state and issues permits. This program controls point-source discharges of pollutants into state waters in accordance with state water quality standards. Permits are required for point-source discharges, two of which apply to mining (industrial and wet weather). Industrial permits regulate wastewater generated from production, requiring identification of all pollutants present in the effluent, determination of EPA technology-based guidelines or industry best available technology, determination of water quality based effluent limits, and draft permit with effluent limits.	Permit	
Solid Waste Program	329 IAC 10, 11, 12	Yes	Waste	IDEM's office of Land Quality regulates solid land disposal and processing facilities. Foundry waste, including slag, sludge, and baghouse dust, is regulated as non-municipal solid waste rather than hazardous waste. Generators of foundry waste must evaluate their waste and determine whether to send their wastes to restricted waste sites or solid waste facilities.		

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
Indiana Hazardous Waste Regulations	40 CFR Part 26; 329 IAC 3-8	Yes	Waste	Indiana is currently authorized to implement the RCRA Subtitle C base program. Although mineral processing wastes are generally excluded from regulation under RCRA Subtitle C, spent potliners from primary aluminum reduction (K088), emission control dust/sludge from the primary production of steel in electric arc furnaces (K061), and spent pickle liquor generated by steel finishing operations at facilities within the iron and steel industry (K062) are regulated as hazardous waste under RCRA and Indiana Hazardous Waste Regulations. Additionally, certain mining and oil exploration waste is under jurisdiction of IDNR.	Permit; Performance standards; Operational requirements	

Table I. Minnesota: State-Level Regulations Applicable to Hardrock Mining and Mineral Processing

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
General Environmental Review Requirements						
Minnesota Environmental Policy Act (MEPA)	MAR 4410.0200 - MAR 4410.6500	No	General	Establishes a review process for state agency actions with a "significant" impact on the environment. An environmental assessment worksheet (EAW) is mandatory for: • Mineral deposit evaluation of deposits other than natural iron ore or taconite • Expansion of a stockpile, tailings basin, or mine by 320 or more acres • 25 percent or more expansion of a plant • Any case where a governmental unit with approval authority deems a "potential for significant impacts" An Environmental Impact Statement (EIS) is mandatory for: • Mineral deposit evaluation of 1,000 tons or more of radioactive material • Construction of a new tailings basin for a metallic mineral mine • Construction of a new metallic mineral processing facility • Any project where a governmental unit with	Preliminary environmental assessment	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
				approval authority deems a "potential for significant impacts"		
Mineland Reclamation Act – Non-Ferrous Metallic Minerals Permit	MAR 6132.1000 – 6132.1400	No	General	All mining operations of nonferrous metallic minerals are required to have a permit. The application requires a mine waste characterization study, an environmental background study, a mining and reclamation plan, financial assurance, and annual reporting of actual mining and reclamation occurring. Mining companies must also submit a request for release from permit, which describes the post-closure activities and shows that environmental goals have been met.	Permit; Performance standards	
Mineland Reclamation Act – Permit to Mine Metallic Minerals.	MAR 6130.4200 - 6130.6300	No	General	Permit required for all mining operations for metallic minerals. Permits are subject to separate standards for ferrous and non-ferrous minerals. Requires a range of environmental and technical reviews carried out by mining company and reviewed by the state.	Permit	
Media-Specific Regulation						
Mineland Reclamation Act – Taconite and Iron Ore Mining Standards	MAC 6130.1000 - 6130.4100	No	General	All operations where iron is the predominant metal extracted must meet general criteria for siting. Criteria include minimizing impacts due to wind erosion and air emissions, reducing major watershed modifications, and	Permit; Performance standards; Technology-based standards; Operational requirements	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
				minimizing runoff and seepage. Requirements are specified for stockpiles management, blasting, vegetation, and other aspects of mining. Mining is not allowed in a range of "exclusion areas," including near certain water bodies and national monuments.		
Mineland Reclamation Act – Non-Ferrous Metallic Minerals Mining Reclamation Standards	MAC 6132.1000 – 6132.1400	No	General	During mining, reclamation, and closure, all non-ferrous mining permit holders must comply with storage and disposal standards for reactive mine waste and overburden, construction, operation, and closure standards for storage piles, tailings basins, and heap and dump leaching facilities, revegetation standards, blasting standards, subsidence standards, dust control standards, and standards for the closure / post-closure maintenance process.	Performance standards; Technology-based standards	
MAR Chapter 7035: Solid Waste - Solid Waste Management Standards	MAC Chapter 7035	Yes	Land	Definition of solid waste includes waste materials from mining activities. Excludes certain hazardous waste rocks, special nuclear wastes, and waste regulated under section 402 of the federal water pollution control act. Solid waste land disposal facilities must design, construct, and operate facilities based on environmental protection	Operational requirements; Performance Standards	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
				requirements. Facilities are subject to a range of reporting and post-closure care requirements.		
Water Quality Standards for Protection of Waters of the State	MAC 7050.0100 - 7050.0465	Yes	Water	Water quality standards are based on seven separate use classes. Standards may be more stringent than federal CWA standards. Discharges are also regulated differently based on the size of the point source.	Performance standards	
State waters discharge restrictions /State Disposal System (SDS)	MAC 7053.0135 to 7053.0405	Yes	Water	Applies to all discharges of sewage, industrial, and other wastes to all waters of the state, both surface and underground. In addition to federal standards, permit holders are subject to effluent standards related to nutrients, pH, biochemical oxygen demand, total suspended solids, oil, and toxic or corrosive pollutants.	Performance standards	
CWA - Section 401 Certification		Yes	Water	Minnesota issues CWA 401 permits to protect federal and Minnesota water quality standards. Required for any activities that could discharge a pollutant into U.S. waters.	Permit; Performance standards	
DES/SDS storm water permit	MAC 7090.0010 – 7090.3080	Yes	Water	Minnesota has separate programs for construction, industrial activities, and municipal stormwater. Industrial activity permit required for industrial activity (as defined by the law) or where the commissioner determines that an activity may cause a breach of water	Permit; Performance standards	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
				quality standards. Requires a stormwater pollution prevention plan. Conditional exclusions for no exposure are allowed if snow, rain, snowmelt, and runoff are not exposed to industrial materials.		
NPDES/ SDS water quality permit for wastewater discharges	MAC 7001.1000 – 7001.1150	Yes	Water	The Minnesota Pollution Control Agency issues NPDES permits to all wastewater discharges to surface waters, and issues State Disposal System (SDS) permits for the construction and operation of all wastewater disposal systems.	Permit; Performance standards	

Table J. Montana: State-Level Regulations Applicable to Hardrock Mining and Mineral Processing

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
General Environmental Review Requirements						
Exploration License, General Operating Permit, Multiple Quarry Permit (Montana Hard Rock Mining Reclamation Act)	ARM 17.24.101 - ARM 17.24.189 ; MCA 82-4-335	No	General	A permit is required for the exploration or mining of all ore, rock, or substances except oil, gas, bentonite, clay, coal, sand, gravel, peat, soil materials and uranium. Exploration licenses require a plan of operations explaining the exploration techniques and a reclamation plan. Exploration projects are subject to restrictions on road placement, impacts to streams, erosion control, and reclamation standards. Before mining, facilities must submit a reclamation plan detailing the surrounding environmental conditions and land uses, and a plan of action for restoring the land after mining is complete. Montana DEQ is allowed to place additional requirements onto the plan. A less extensive review is required for miners that disturb less than 5 acres of surface and stay within other parameters. The rule requires that small miners agree in writing not to pollute any streams, with recommended best management practices for mitigating impacts rather than formal standards. DEQ can issue an order suspending the license or permit if it causes harm to health and safety of people, causes harm to the environment, or remains in violation of a corrective action order.	Permit, Technology-based standards; Operational requirements; Preliminary environmental assessment	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
Milling Permits (Montana Hard Rock Mining Reclamation Act)	ARM 17.24.101 - ARM 17.24.189	No	General	Milling operations are subject to permitting. In the permit application, operations must submit an operating plan that contains a description of the surrounding environment, a plan for milling, expected best management practices, and a reclamation plan. Rules apply to mills under permit after June 1, 1990.	Permit; Preliminary environmental assessment	
Hard Rock Mining Impact Plan and EIS (Hard Rock Mining Impact Act; Montana Environmental Policy Act [MEPA])	MCA Section 90-6 Part 3 and Part 4; MCA Section 75-1-201	No	General	Large scale hard-rock mining projects must write an impact plan, including an environmental impact assessment, as a prerequisite to getting a Montana Department of Environmental Quality (MDEQ) mining permit. Involves writing an EIS for state agency actions (incl. issuing a permit) that are considered to have a “significant” impact on Montana’s environment and are not exempt from MEPA.	Preliminary environmental assessment; Permit	
Memorandum of Understanding with the Federal BLM	BLM-MOU-MT921-0509	No	General	MOU governing all hard-rock mining activities that are regulated by the BLM under the Federal Land Policy and Management Act. Establishes framework for coordination on permitting, and environmental analysis and documentation.	Preliminary environmental assessment	
Media-Specific Regulation						
Opencut Mining Program permits	MCA 82-4-401 et seq	No	Waste	Permits are required for opencut mining operations. Requires a site evaluation by Montana DEQ, a statement that the operator will protect on- and off-site surface water and groundwater from deterioration of water quality and quantity, and statements about safe storage of stockpiles and management of paved roads.	Permit; Operational requirements; Performance standards	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
				Permit requires an annual progress report to DEQ.		
Metal Mine Reclamation Standards	MCA Section 82-4 Part 3	No	General	Standards include specific operational and reclamation requirements for mineral mining that must be incorporated in the reclamation plan, including a 2 year time limit on reclamation after completion or abandonment, treatment of objectionable effluents, vegetative cover, and structural stability. Surface mining for gold or silver using heap leaching or vat leaching with cyanide ore-processing reagents is generally prohibited.	Operational requirements	
Strip and Underground Mine Reclamation Act	ARM 17.24.301 through 1309	No	Waste	Applies to mining of coal and uranium. Law has extensive standards for waste burial/storage/disposal, sediment control, groundwater protection, surface water protection, revegetation, wildlife protection, future land use, financial assurance, distance from population, and other factors.	Operational requirements; Performance standards	
Montana Water Quality Act; Water Quality Standards	MCA Section 75-5-301; ARM 17.30.601-641 (Surface Water); ARM 17.30-1001-1045 (Groundwater)	Yes	Water	Montana surface water and groundwater are subject to water quality standards, based on beneficial uses. Law and division of use classes are more extensive for surface water than for groundwater.	Performance standards	
Montana Water Quality Act; Montana Pollutant Discharge Elimination System (MPDES) General Permit	MCA 75-5 Part 4	Yes	Water	All point sources of wastewater discharge are required to obtain and comply with MPDES permits. General permits are also required for construction activities that include clearing, grading, grubbing, excavation, or other	Permit; Performance standards	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
				earth disturbing activities that disturb one or more acres and discharge stormwater to state surface waters. Effluent limits are based on federal CWA effluent standards, as well as additional effluent standards from the Montana government to protect beneficial uses and water quality standards.		
Montana Water Quality Act; Montana Groundwater Pollution Control System (MGWPCS) Permit	Yes	No	Water	MGWPCS Permit required for the owner or operator of any existing sources to discharge pollutants in groundwater. Conditions of the permit must assure compliance with groundwater quality standards.	Permit; Performance standards	
Montana Natural Streambed and Land Preservation Act "310" Permit	Mont. Const. art. IX, Section 1; MCA 75-7-102	No	Waste	A permit is required for any activity that alters a stream bed. Several activities are prohibited. Application must contain information regarding the proposed alteration. Project must minimize adverse impacts to the stream.	Permit; Operational requirements	

Table K. Nevada: State-Level Regulations Applicable to Hardrock Mining and Mineral Processing

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
General Environmental Review Requirements						
Nevada Administrative Code – Water Control: Water Pollution Control Permits	NRS 445A.300-NRS 445A.730; NAC 445A.228 - NAC 445A.420	No	Waste; Water	All mining facilities in existence after 9/1/1989 with the potential to degrade state waters are subject to permitting. Permit application must include an analysis of surrounding environmental conditions and the proposed mining technologies used. (NAC 445A.387). The permit is valid for 5 years as long as the operator remains in compliance with the terms of the permit. The permit is subject to public review. Facilities that process less than 36,500 tons of ore per year and less than 120,000 tons of ore over the lifetime of a project are subject to reduced review requirements.	Permit; Preliminary environmental assessment	
Nevada Administrative Code –Reclamation of Land Subject to Mining Operations or Exploration Permits: Reclamation Permit	NRS 519A.010 - NRS 519A.290; NAC 519A.010 - NAC 519A.240	No	Waste	Exploration and mining projects in Nevada are required to apply for a permit. The permit application must include a plan for reclamation including schedule, methods, a description of the expected land disturbances, a description of mitigation practices, and a plan for and a review of the surrounding environment. Regulation applies to all operations active as of 10/1/1990.	Permit; Preliminary environmental assessment	.

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
MOU between the Nevada Department of Environmental Protection (NV DEP) and BLM for Mining-Related Environmental Impact Statements within the State of Nevada	MOU 1793-NV920-0804 4/30/2008	Yes	General	Mining operations on BLM land in Nevada disturbing more than five acres require a plan of operations. The MOU includes guidance on NEPA compliance, and other federal reviews such as the Endangered Species Act and the National Historic Preservation Act) for resolving disputes between the two agencies during the planning process.	Preliminary environmental assessment	
Media-Specific Regulation						
Nevada Water Control Standards for holders of Water Pollution Control Permits (specific to mining facilities)	NRS 445A.300-NRS 445A.730; NAC 445A.424 - NAC 445A.447	No	Water	All mining facilities in existence after 9/1/1989 with the potential to degrade groundwater are subject to procedural requirements to prevent releases, minimum design criteria for fluid and waste management, performance standards for stabilization of ore and tailings, and monitoring requirements. Facilities are required to meet performance standards for effluent releases and stabilization of waste; facilities must meet minimum design criteria for waste disposal units, and must monitor performance.	Technology-based standards; Performance standards; Operational requirements	
Nevada Mining Reclamation Standards for holders of Reclamation Permits	NRS 519A.010 - NRS 519A.290; NAC 519A.245 - NAC 519A.345	No	Waste	All land disturbed by mining must be restored to a level of productivity equal to what it was before mining activity or equal to adjacent land uses. Facilities are required to stockpile topsoil in the area and return it after mining, as well as conduct re-vegetation of the land. Nevada Department of Natural Resources (NV DNR) can also require other reclamation processes. Exemptions can be made for open pits and rock faces that are not feasible to reclaim.	Operational requirements; Technology-based standards	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
Nevada Administrative Code - Water Controls: Nevada Water Quality Standards	NAC 445A.11704 – NAC 445A.22755	Yes	Water	Standards include acceptable contaminant concentrations, pH ranges, and temperatures for state waters. Standards are specific to each geographical area and water use. Standards also include corrective action requirements for hazardous contaminants in ground and surface water.	Performance standards; Operational requirements	
CWA: NPDES permit	NRS 445A.300 -445A.730; NAC 445A.070 - 445A.348; NRS 445A.465; 40CFR 122.26	Yes	Water	Federal permit (administered by NV DEP) for discharges into surface waters of the state. Permits contain performance standards required to meet state and federal water quality standards, and may also include best management practices. Certain activities, as defined by 40 CFR § 122.26(b)(14) require stormwater discharge permits. Permit application requires a Notice of Intent (NOI) and a Stormwater Pollution Prevention Plan. General Permit NVR300000 applies specifically to stormwater discharges from metals mining activities to Waters of the U.S.	Permit; Performance standards	
CWA: Nevada 401 Certification Program	CWA USC 33 1341—Section 401(a)(1)	Yes	Water	The State of Nevada certifies that federal actions do not violate state water quality standards. These usually involve Federal Energy Regulatory Commission (FERC) licensing for electric plants and discharges of dredge and fill materials, including from gravel mining.	Certification; Performance standards	
Nevada Administrative Code - Water Controls: Nevada UIC Permit	NRS Chapter 445A; NAC 445A.865 – NAC 445.925; NAC 445A.810 –	Yes	Water	Disposal in any underground injection well requires a permit. Permits are required as of 7/22/1987. Permits are issued for a period of 5 years. Regulations lay out five classes of wells, including types specifically associated with mining. Wells are	Permit; Performance standards; Operational standards.	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
	NAC 445.862			subject to several standards for placement, mechanical integrity, abandonment, and injection pressure, depending on the class of the well. Underground injection wells are also subject to monitoring requirements, technical standards for construction, injection methods, leak detection, and plugging and abandonment.		
Nevada Administrative Code - Sanitation: Nevada Solid Waste Regulations	NRS 444.440 – NRS 444.645; NAC 444.570 - NAC 444.7499	Yes	Waste	Solid waste disposal facilities and facilities holding construction and demolition wastes are subject to permitting, siting, monitoring, financial assurance, and technical standards. Nevada revised statutes state that no provision in NRS 444.440 - 444.620 may prevent a mining operation from disposing of waste from its own operation on site.	Technology-based Standards; Performance standards; Operational requirements; Permit	
Nevada Revised Statutes: Hazardous Materials: regulation of mills and by-products	NRS 459.300– NRS 459.370	No	Waste	Licensing and financial assurance are required for the milling and disposal of waste from thorium and uranium recovery and refining operations. A license also requires a review of potential environmental effects of the operation.	Permit	

Table L. Tennessee: State-Level Regulations Applicable to Hardrock Mining and Mineral Processing

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
General Environmental Review Requirements						
Tennessee Department of Environment & Conservation (TDEC) Surface Mining Permit	TDEC Rule 0400-3 et seq.; TCA§ 59-8-201 et seq.	No	General	The TDEC Division of Water Resources, Mining Section issues permits to operations that engage in mining and mining-related surface disturbances. Clay, stone, phosphate rock, and metallic ore mining operations require permits. The permit application requires a reclamation plan. The Mining Section has the right to inspect permitted sites when necessary. The application for a Surface mining permit requires information on the mining operations, mineral to be mined, and acreage to be disturbed.	Permit	
Media-Specific Regulation						
TDEC Solid Waste Management Permit-by-Rule	Rule Chapter 0400-11-01-.02(2) - .02(5); T.C.A. 68-211-106	Yes	Waste	The TDEC Division of Solid and Hazardous Waste Management administers Permit-by-Rule authorizations. Permit-by-Rule authorizations are required for any solid waste processing operation that changes the chemical or physical characteristics of a solid waste. A Permit-by-Rule application requires a written explanation of how an operation will comply with the applicable criteria and information regarding storage capacity. TDEC may inspect a facility without an announcement and has the responsibility to regulate solid waste processing facilities to protect the health of the public and environment.	Permit; Operational requirements	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
TDEC Division of Water Resources NPDES Permit	Rule 1200-4-1,3,4, 5 ;T.C.A. 69-3-101; TCA 69-3-108(b),(2),(3),(4),(6)	Yes	Water	Under the Tennessee Water Quality Control Act, TDEC Division of Water Resources issues NPDES permits to municipal, industrial, and other operations that discharge wastewater. Mining facilities are required to obtain NPDES discharge permits. Mining and other industrial operations must submit information regarding flow, source of pollution, and treatment, treatment technologies, and methods to reduce pollutants in discharge, as part of the application process. The permit program sets pollution control and monitoring requirements based on water quality standards and other applicable state and federal rules.	Permit	
Tennessee Water Quality Standards General Rules; General Water Quality Criteria	Rule 0400-40-02	Yes	Water	This rule establishes criteria for seven classified uses of water, and contains Tennessee's Antidegradation Policy. The rule identifies Exceptional Tennessee Waters, and establishes that these areas are unsuitable for mining, pursuant to the federal Surface Mining Control and Reclamation Act. The rule states that groundwater from "Acid Production Zone from Mining Activities" (e.g., areas in which acid mine/rock drainage occurs) is unusable.	Performance standards; Operational requirements	
Tennessee Storm Water Multi-Sector General Permit for Industrial Activities	TCA 69-3-101	Yes	Water	This permit regulates point source discharges of stormwater associated with industrial activities. In accordance with a storm water prevention plan and effluent standards (0400-40-04), a number of industry sectors are authorized to discharge stormwater runoff. Those sectors include: metal mining, construction sand and gravel mining and processing, dimension stone mining	Permit; Operational requirements	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
				and quarrying facilities, and primary metals facilities. The application for this permit includes a notice of intent for Storm Water Discharges Associated with Industrial Activity and an annual Storm Water Monitoring Report.		
TDEC Division of Water Resources Aquatic Resource Alteration Permit (ARAP)	Rule 0400-40-07	No	Water	The TDEC Division of Water Resources issues permits to facilities that wish to make alterations to a body of water or wetland. Examples of these types of alterations include dredging, channel widening, diversions, dams, and wetland draining.	Permit	
TDEC Certificate of Approval and Safety for Dams	Rule 0400-45-07; TCA § 69-11-101 et seq.	No	Water	The removal, alteration, construction, and operation of a non-federal dam each require approval from the TDEC Division of Water Resources, Dams Section. The application for this permit requires descriptions of the dam and reservoir as well as the designs for the dam. The division may inspect the site periodically and assess financial penalties for violations.	Permit	
TDEC - UIC Permit	Rule 0400-45-6; TCA 69-3-101 et seq.	Yes	Water	The TDEC Division of Water Resources, Ground Water Management Section regulates facilities that discharge industrial or chemical waste into subsurface systems other than city sewers. The Division also regulates facilities that modify certain topographical characteristics key to groundwater drainage (Karst features). The permit requires a UIC application. Additional application materials include chemical analysis of injection fluid, process descriptions, operation and maintenance procedures, and	Permit; Operational requirements	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
				erosion and sediment control descriptions. The Division may inspect a facility annually or as necessary. Class III wells can be used to inject fluids for mineral extraction and Class V wells include a variety of mineral recovery wells.		

Table M. Texas: State-Level Regulations Applicable to Hardrock Mining and Mineral Processing

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
General Environmental Review Requirements						
TCEQ Radioactive Material License	30 TAC Subpart L; 30 TAC Chapters 336, 37, 39, 50, 55, 80, 281, 305; Texas Health and Safety Code 401	Yes	General	Texas is an "Agreement State" under the Atomic Energy Act. In situ uranium recovery operations are required to obtain a radioactive material license. In applying for this license, potential operators must include environmental and safety review elements in the NRC's NUREG-1569, "Standard Review Plan for In Situ Leach Uranium Extraction License Application." TCEQ will inspect these operations at least annually for operator permit compliance.	Permit	
Texas Railroad Commission (RRC) surface coal mining and reclamation requirements	Tex. Nat. Res. Code Ann. § 134.012 et seq	No	General	Texas surface coal mining and reclamation requirements require permits for coal, lignite, and uranium. Texas does not require statewide permits for mining other minerals. Iron ore and iron ore gravel mining may also be regulated under the Texas Surface Coal Mining and Reclamation Act and associated regulations depending on the scope of the mine. Permit requirements for both surface and underground mines include the submission of environmental data and a reclamation plan.	Permit	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
RRC Uranium Exploration Permit Program	Title 4, Mines and Mining, Chapter 131, Texas Uranium Exploration, Surface Mining and Reclamation Act	No	General	Permit is required for uranium mining exploration, is valid for 12 months, and governs all disturbances. The permit requires pre-exploration water quality examinations, operating requirements, plugging requirements, and site reclamation. RRC inspects active uranium exploration sites each month.	Permit	
Media-Specific Regulation						
Texas Surface Water Quality Standards	Title 30 Chapter 307 TAC	Yes	Water	Texas Surface Water Quality Standards establish quality goals, appropriate uses, an anti-degradation policy, and numerical criteria for water quality standards (dissolved oxygen temperature, pH, dissolved minerals, toxic substances, and bacteria).	Performance standards	
TCEQ Underground Injection Well Permit Program	Chapter 27 of Texas Water Code	Yes	Water; Waste	TCEQ and the RRC regulate five classes of underground injection wells. TCEQ regulates Class I, III, and IV wells. RRC regulates Class II and V wells. In situ Sodium Sulfate and Uranium operations are both required to obtain a Class III injection well permit from TCEQ. TCEQ conducts technical reviews, including reviewing the geohydrologic and engineering aspects of proposed Class III and V well facilities.	Permit; Operational requirements	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
TCEQ Multi-Sector General Permit (TXRR050000); TCEQ Individual Industrial Wastewater Permit (Texas Pollutant Discharge Elimination System (TPDES))	Chapter 26, 39, 40, 50, 55, 60, 80, 213, 281, 305, 307, 308, 309, 311, 319	Yes	Water	TCEQ authorizes the discharge of stormwater for certain industries with an Industrial Multi-Sector General Permit. Industries include: concrete and gypsum products, primary metals, metal mining, ore mining and dressing, and mineral mining and dressing. This permit is only issued for discharges that are in compliance with Water Quality Standards. This permit sets benchmark monitoring requirements and effluent limitations for a number of mining and processing activities, including: • steel works • blast furnaces • iron and steel foundries • nonferrous castings • rolling, drawing, and extruding of nonferrous metals. Facilities that do not qualify for a general permit, or opt not to apply, must obtain an individual industrial wastewater permit.	Permit	
Texas Hazardous Waste Regulations	40 CFR Part 26; 30 TAC 335	Yes	Waste	Texas is currently authorized to implement the RCRA Subtitle C base program, which applies to several mineral processing wastes. Texas Hazardous Waste regulations oversee permitting and monitoring of hazardous waste generators and management facilities.	Permit; Performance standards; Operational requirements	
Texas Railroad Commission surface coal mining and reclamation requirements	131.002 Texas Statutes	Yes	General	This statute regulates the reclamation of land used for minerals and surface-mining operations. It sets reclamation and maintenance requirements, including processes such as contouring, terracing, grading, backfilling, resoiling, and revegetation.	Operational requirements	

Table N. Utah: State-Level Regulations Applicable to Hardrock Mining and Mineral Processing

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
General Environmental Review Requirements						
Minerals Regulatory Program Notice of Intention	Title R647, Utah Administrative Code (UAC) (1988)	No	General	Rule R647-2 sets the standards for mining exploration. It requires a Notice of Intention to Conduct Exploration 30 days before operations begin. It requires description of project, practices, hole plugging, and reclamation practices. It also requires a description of the exploration project. Rule R647-3 regulates small mining operations. Operators must submit Notice of Intention to Commence Small (less than five disturbed acres) Mining operations 30 days before operations begin. The notice of intention must include a brief narrative description of the proposed operations. If the operator plans to enlarge the mine to a size greater than five acres, it must file a Notice of Intent with the Division. Rule R647-4 regulates large mining operations using many of the components of Rule R647-3. Additionally, the notice of intention must include an Impact Assessment (identifying potential surface or subsurface impacts), fulfillment of hole plugging requirements, and a reclamation plan. If the operator plans to enlarge the mine to a size greater than five acres, it must file a Notice of Intention to Commence Large Mining Operations, and receive approval from the Division. The rule requires annual reporting of waste	Preliminary environmental assessment	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
				materials, new surface disturbances, total amount of ore and waste materials moved, and reclamation work performed.		
Media-Specific Regulation						
Minerals Regulatory Program	UAC Title R647-2; R647-3; R647-4	No	Water	These rules regulate mining exploration and operation practices. Public safety and welfare practices include the closing of shafts, disposal of waste, plugging of holes. Additionally, the rules address drainages, erosion control, deleterious materials, soil management, and concurrent reclamation. The rule also sets hole plugging requirements and reclamation practices.	Operational requirements	
Utah Ground Water Quality Protection Program	UAC Title R317	No	Water	This rule sets Ground Water Quality Standards, Ground Water Classes, Protection Level, and Ground Water Classification for Aquifers. No facility may cause ground water to exceed ground water quality standards or the applicable ground water class Total Dissolved Solids (TDS) limits. If the background concentration for affected ground water exceeds the ground water quality standard, the facility may not cause an increase over background. This requirement does not apply to facilities undergoing corrective action under R317-6-6.15A.3.	Permit	
Ground Water Monitoring Requirements	UAC Title R315-308	No	Water	This rule sets the Ground Water Quality Protection Standards. Facilities are required to perform ground water monitoring and comply with the groundwater monitoring requirements. The rule also regulates the Corrective Action	Performance standards	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
				Program for owners and operators who do not successfully demonstrate that their facility meets groundwater quality standards.		
Utah Pollution Discharge Elimination System (UPDES) program	UAC Title R317-8	Yes	Water	Facilities that produce, treat, dispose of, or otherwise discharge wastewater may need UPDES permits from the Division of Water Quality. Discharging wastewater to surface waters, including storm drains, or water well drilling activities, requires a permit before beginning operations. Storm water discharge permits are required for certain construction projects, industrial facilities, and municipal separate storm sewer systems. Any facility that discharges or may discharge pollutants to ground water needs a permit. Major agricultural, municipal, and industrial dischargers are regulated. Operating Permits are required for all wastewater treatment systems, whether surface or underground, that are not operating under one of the other types of permits.	Permit	
Utah Mined Land Reclamation Act (Act) regulations	Title R647, Utah Administrative Code (UAC)	No	General	The R647, Natural Resources, Oil, Gas and Mining; Non Coal, regulations were developed pursuant to the Utah Mined Land Reclamation Act, which applies to exploration, development, and extraction of hardrock minerals on all lands, and states that every operator is obligated to conduct reclamation and is responsible for reclamation costs and expenses. (40-8-12.5).	Operational requirements	

REGULATION, PERMIT, OR REVIEW	CITATION	DELEGATED FEDERAL PROGRAM	MEDIA/ RELEASE TYPE	SUBSTANCES/ACTIVITIES REGULATED	REGULATION TYPE	NOTES
				The R647 rule sets standards for mining operation practices, which include drainage, erosion control, soil management, and concurrent reclamation. It also regulates hole plugging requirements. It further regulates reclamation practices, and provides a list of practices to minimize hazards to public safety/welfare. The mining exploration rule requires annual reporting, regarding drilling conditions, water encountered, hole plugging measures, etc. Rules R647-3 and R647-4 regulate operation practices relating to drainages, erosion control, deleterious materials, soil management, and concurrent reclamation The rule also sets hole plugging requirements and reclamation practices. Annual reporting of waste materials, new surface disturbances, total amount of ore and waste materials moved, and reclamation work performed is also required.		

Message

From: Laura Skaer [lskaer@miningamerica.org]
Sent: 7/11/2017 6:24:18 PM
To: Brown, Byron [brown.byron@epa.gov]; Davis.patric@Epa.gov
Subject: AEMA Comments on CERCLA 108(b)
Attachments: AEMA Comments on CERCLA 108(b) Proposed Rule with Attachments.pdf

Byron and Patrick,

Attached are the comments we filed today via regulations.gov.

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July 11, 2017

Environmental Protection Agency
Office of Resource Conservation and Recovery
1200 Pennsylvania Ave. NW
Washington, D.C. 20460

Re: Comments on Financial Responsibility Requirements under CERCLA §108(b) for Classes of Facilities in the Hardrock Mining Industry
82 Fed Reg. 3388
Docket ID No.: EPA-HQ-SFUND-2015-0781

Submitted via http://www.regulations.gov

The American Exploration & Mining Association (AEMA) submits the following comments on the Environmental Protection Agency's (EPA) proposal to establish financial responsibility requirements for the hardrock mining industry under CERCLA §108(b).

AEMA (*formerly Northwest Mining Association*) is a 122-year old, 2,000-member national association representing the minerals industry with members residing in 42 U.S. states, seven Canadian provinces or territories, and 10 other countries. AEMA is the recognized national voice for exploration, the junior mining sector, and maintaining access to public lands, and represents the entire mining life cycle, from exploration to reclamation and closure. More than 80% of our members are small businesses or work for small businesses. Most of our members are individual citizens.

Executive Summary

EPA's CERCLA §108(b) Proposed Rule for hardrock mining and beneficiation is a classic "*solution in search of a problem*;" a problem that clearly does not exist. For the reasons set forth below, AEMA submits that EPA should withdraw the regulations in the Proposed Rule and issue a Final Rule concluding that no additional financial responsibility for hardrock mining pursuant to CERCLA §108(b) is required. EPA has failed to establish that the *degree and duration of risk associated with the production, transportation, treatment, storage, or disposal of hazardous substances* for hardrock mining require a rule that imposes duplicative, onerous and economically devastating financial responsibility (FR) requirements. EPA has failed to recognize that federal land management agencies (FLMAs) and state mining regulatory programs reduce the *degree and duration of risk* to minimal levels, and their financial assurance (FA) programs ensure that there is no un-bonded or unfunded risk of Superfund liability.

EPA has failed to recognize that hardrock mining practices are significantly different today than in 1980 when CERCLA was enacted (*See* Appendix E, *REVIEW OF ENVIRONMENTAL PROTECTION AGENCY REPORTS, FINANCIAL RESPONSIBILITY RULES,* By the SOCIETY FOR MINING METALLURGY & EXPLORATION, INC., attached to the National Mining Association's [NMA's] comments). Over the past 35 years, mining practices have changed, engineering controls have been developed, plus federal and state regulatory programs and FA requirements have been adopted. Societal values have changed too, and industry became more aware of its impact on the environment.

The attached White Paper and exhibits (referenced hereinafter as "White Paper" and incorporated by reference), *HARDROCK MINING RECLAMATION AND REGULATION - DEVELOPING SUSTAINABLE ENVIRONMENTAL PROTECTION THROUGH CHANGING VALUES, CHANGING LAWS AND EXPERIENCE: A FEDERAL AND STATE REGULATORY SUCCESS STORY,* explains the evolutionary process from historic mining to today, where hardrock mines are designed, permitted, built and operated for closure. Prior to 1970, hardrock mines were typically designed and built to maximize production and minimize cost with little or no regard for environmental values. This was no different than other industries.

However, beginning in the 1980s almost all new hardrock mines have been designed, built and operated to integrate long-term environmental closure and reclamation as a primary design standard, and this is required by current federal and state law. At the same time, the FLMAs and States have significantly evolved their FA programs with specific emphasis on post-closure care and maintenance, thereby minimizing the long-term potential for releases of hazardous substances and un-bonded agency liability.

Throughout 2016, AEMA participated as a Small Entity Representative (SER) during the Small Business Advocacy Review (SBAR) Panel required by the Small Business Regulatory Enforcement Fairness Act (SBREFA) amendments to the Regulatory Flexibility Act. During this process, the FLMAs and state mine regulatory and FA programs demonstrated that their regulations contain enforceable regulatory mechanisms with FA that effectively address each of EPA's 13 response cost categories in the Proposed Rule.

The FLMA and State mine regulatory and FA programs coupled with engineering controls and best practices reduce the *degree and duration of risk associated with the production, transportation, treatment, storage, or disposal of hazardous substances* to minimal levels and no additional FR requirements are necessary to protect the American taxpayer or the Superfund Trust Fund. These FLMA and state reclamation and closure requirements require more than reshaping land and revegetation. They require a mine to be designed, built, operated and closed to prevent the release of hazardous substances and ensure compliance with statutory and regulatory standards through the entire mine life cycle, including closure and post-closure.

Initially, when CERCLA was passed on December 11, 1980,[1] Congress directed the Executive Branch to implement FR requirements in accordance with the "*degree and duration of risk*" associated with the "production, transportation, treatment, storage or disposal of hazardous substances."[2] This congressional authority was tied directly to the level of risk and the necessity for federal regulation.[3] The President was granted discretion to implement these requirements, but required by Congress to 1) take into consideration the needs of the various industries for oversight and 2) consult with those who would provide financial backing for operations, to make sure appropriate funding would be available.[4] As demonstrated below, these two requirements have not been satisfied by the Proposed Rule.

Nevertheless, at the time CERCLA was enacted, the Executive Branch did not take action, nor did it take action after the SARA amendments were implemented in 1986. Similarly, EPA took no action after it was delegated authority in 1987 through Executive Order 12580.[5] In the decades that have passed since CERCLA was enacted, it has been primarily the FLMAs and individual States that have filled this void and satisfied the need for FR requirements for the hardrock mining industry.

As explained in the attached White Paper to this comment letter and cited above, the FLMAs and states have increased their oversight of mine permitting and reclamation practices, and they have developed comprehensive schemes covering all aspects of the mine permitting, reclamation and FA process. It is unusual that government and industry agree on environmental issues. In this case, however, industry, States, FLMAs, and the U.S. Small Business Administration (SBA) have had the same message to EPA in the CERCLA §108 (b) rulemaking--that existing FR programs are working at modern mines and there is no need for a costly and duplicative EPA program.

FLMA and State programs tie FA requirements to each mine's individual permit stipulations for operations and closure, and these requirements are reviewed and updated by the FLMA and/or State on a continual basis. EPA's Proposed Rule ignores these existing FLMA and State schemes and ignores the adverse effect that duplicative federal oversight would have on these states and their citizens. Instead of considering the present degree of risk and taking into consideration required input from FA providers, EPA's Proposed Rule is the result of litigious pressure from anti-mining environmental groups and special interests. Without regard to facts, EPA's Proposed Rule duplicates FLMA and state agency requirements, creates conflicts of law, and bypasses local administrative authorities who have proven expertise in reviewing, permitting, and overseeing mining projects.

In developing its Proposed Rule, EPA has ignored the fact that advances in engineering controls, technology, mining industry best practices, and FLMA and State regulatory programs have lowered the "*degree and duration of risk*" to a point that FR requirements pursuant to CERCLA

[1] https://www.epa.gov/superfund/superfund-cercla-overview
[2] 42 USCA § 9608(b)(1)
[3] *Id.*
[4] *See* § 9608(b)(2).
[5] 52 FR 2923, 3, CFR, 1987 Comp., p. 193.

§108(b) for the hardrock mining industry are not required. Simply put, the EPA's Proposed Rule should not move forward because it exceeds the agency's authority under CERCLA; is unnecessary, duplicative, and conflicts with FLMA and State laws and regulations; relies on faulty, incomplete studies; and inappropriately targets the hardrock mining industry.

Had EPA proposed a CERCLA §108(b) rule for hardrock mining in the 1980s, the agency might have been able to make a case that such a rule was supported by the evidence. At that time, federal and state mine regulatory programs were still evolving (*See* White Paper), and limited FA was often required. Several western mining states did not have mining regulatory programs until the early 1990s.

Over the past 25 - 30 years, these programs have greatly advanced, adapted to new information and responded to fill gaps in both their regulatory and FA programs as circumstances have required. These programs have proven effective as the National Academy of Sciences, in response to a request from Congress, determined in a comprehensive 1999 report entitled *Hardrock Mining on Federal Lands*. The Report concluded that the overall structure of federal and state laws and regulations that provide mining related environmental protection is complicated, but generally effective. Furthermore, in 1999, BLM and USFS responded to a 2011 letter from Sen. Lisa Murkowski (R-AK) that combined, the two FLMAs had approved more than 3,300 mining plans of operation since 1990, and none of those have been added to the CERCLA National Priorities list.[6]

In the preamble to the Proposed Rule, EPA admits that CERCLA §108(b) FR may not be necessary: "*…there could be an associated risk that the rule will potentially require financial responsibility that may never be required.*[7]" This stunning admission demonstrates the Proposed Rule is arbitrary and capricious. There can be no justification for proposing such a costly rule that may never be needed. EPA's proposal to impose, at a minimum[8], a $7.1 billion superfluous CERCLA §108(b) FR program on the hardrock mining industry is completely untenable, especially in view of the minimal risk of unpermitted releases of hazardous substances.

Thus, the evidence is overwhelming that the CERCLA §108(b) mandate has been met by the FLMA and State regulatory and FA programs and no additional FR requirements pursuant CERCLA §108(b) are necessary to protect the federal Superfund program and the American taxpayer. The regulations in the Proposed Rule should be withdrawn and EPA should issue a Final Rule concluding that no additional FR requirements under CERCLA §108(b) are necessary for the hardrock mining industry.

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[6] The White Paper includes an analysis of EPA's National Priorities List (NPL) for Mining and Milling Sites (MMS) completed in April, 2015 by Richard DeLong, Enviroscientists, Inc. (now EM Strategies). DeLong's analysis revealed that there are over 1,100 sites on the NPL and EPA classifies 100 as MMS. However, only 55 of those sites are actual mining operations where a mineral was extracted from the earth. The other 45 are mineral processing facilities not associated with a hardrock mine. The 55 hardrock mine sites breakdown into the following temporal classifications: 49 are prior to 1970; 5 are from 1970-1990; and one, Barite Hill in SC is post 1990. The DeLong analysis is included with the White Paper and incorporated by reference.
[7] FR at 3463
[8] *See* Freeport-McMoRan comment letter dated May 5, 2017, at page 3, "a more representative value from EPA's regulatory impact analysis yields a figure of $15.7 billion."

I. CERCLA's Statutory Mandate has been met by the FLMAs and States' Mine Regulatory and FA Programs

CERCLA §108(b)(1) directly addresses the relationship of EPA's program to other Federal requirements. Specifically, Congress directed EPA to promulgate requirements for classes of facilities "***in addition to*** those under subtitle C of the Solid Waste Disposal Act [42 U.S.C.A. § 6921 et seq.] ***and other Federal law***[.]" 42 U.S.C. §9608(b)(1) (emphasis added). EPA claims to "read this provision in a most straightforward way: Requirements in this proposed rule are quite literally 'in addition to' whatever FR requirements may be imposed under other ***Federal laws for other purposes***." 82 Fed. Reg. 3402 (emphasis added). EPA further argues that the phrase "in addition to" provides no "limitation on the applicability of this section." *Id.* Consequently, under EPA's reading of the statute, "CERCLA §108(b) requirements apply even where a hardrock mine or mineral processor may be subject to, for example, Federal reclamation bonding requirements." *Id.* at 3402-3403.

Contrary to EPA's position, a plain language interpretation of the "in addition to" language in the statute expressly limits EPA's authority and prohibits the agency from duplicating FR requirements that are ***in place pursuant to the Resource Conservation and Recovery Act (RCRA)*** (previously referred to as the Solid Waste Disposal Act) or other Federal laws that share the same purpose, ***including federal reclamation bonding requirements***. The legislative history behind §108(b) supports this commonsense reading of the statute. Specifically, the Senate Report to CERCLA explained that "[i]t was not the intention of the Committee that operators of facilities covered by [RCRA FR requirements] be subject to two financial responsibility requirements ***for the same dangers***." S. Rep. No. 96-848, at 92 (1980) (emphasis added). Instead, CERCLA § 108(b) was intended to cover those facilities "who are ***not now covered by any*** [FR] requirements under [RCRA] section 3004(c)."[9] *Id.* (emphasis added).

While the statute and the legislative history call out RCRA FR requirements specifically, the phrase "other Federal law" clearly shows that Congress envisioned that duplication may also occur with other federal FR requirements and thus EPA should avoid duplicating these programs in a similar manner. Because EPA did not promulgate CERCLA §108(b) FR requirements in the 1980s as Congress directed, this phrase in the statute becomes even more central in interpreting EPA's appropriate regulatory role today as the federal regulatory landscape has substantially grown – particularly for the hardrock mining industry – to include other comprehensive programs that protect against the same risks that triggered Congressional action in the first place.[10]

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[9] *See also* United States Treasury, The Adequacy of Private Insurance Protection under Section 107 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980: A Report in Compliance with Section 301(b) of P.L. 96-510 (June 1983), at 72 ("[F]acilities already covered by the financial responsibility requirements of RCRA and other federal law are not yet again by Section 108.")

[10] EPA argues that "if Congress intended to insert limitations based on other Federal law into CERCLA, it clearly stated them as such." 82 Fed. Reg. 3402. This argument is also not convincing in this context. In 1980, there were few similar programs on the statutory books, with RCRA being the lead example. Congress could not have possibly predicted what other federal departments within the government would do in the future on this same subject matter. The phrase "other Federal programs" recognizes this basic reality. EPA's examples in other sections of CERCLA containing different limiting language are irrelevant to interpreting Section 108(b), which is clearly structured in a specific way to accomplish a purpose that would necessarily evolve over time. *See*

Thus, a plain reading of CERCLA §108(b) prohibits EPA from promulgating FR requirements for hardrock mines covered by FLMA FA. Congress recently reaffirmed this clear intent to avoid duplication in the Conference Committee Report attached to the Consolidated Appropriations Act of 2016 (Public Law 114-113): "Prior to proposing any rule pursuant to section 108(b) . . . the [EPA] Administrator is directed to . . . [include in an analysis] . . . the Agency's plan to avoid requiring financial assurances that are duplicative of those already required by other Federal agencies."

During the SBAR process, the FLMAs and four states made detailed presentations that revealed comprehensive regulatory and FA programs designed to prevent the release of hazardous substances and to provide FA in the event the operator is unable to complete reclamation and closure or take corrective action if and when necessary. These presentations demonstrated that all CERCLA §107 liabilities/obligations addressed by these programs are covered 100%. EPA failed to respond to the SERs and states on this point and has failed to explicitly identify any gaps in the FLMAs' and states' regulatory and FA programs that would justify a rule under CERCLA §108(b).

The six presentations revealed:

- Well-developed and thorough programs that review, permit, oversee, and establish FA for mines under their jurisdiction. These programs take into account the unique geology, geography, terrain, climate, mining methods, engineering controls and management practices attributable to individual mines that reduce the *degree and duration of risk* to appropriate or desirable levels.

- That the FLMAs and States' regulatory and FA programs for hardrock mining clearly cover the release of hazardous substances, provide FA for closure and post closure activities, and demonstrate the functional equivalent of a CERCLA §108(b) rule.

- That the only way a hardrock mining FA program can effectively work is if it is calculated on a site-specific basis. A nationwide FA program and/or a one-size-fits-all formula will not work. Therefore, EPA's proposed use of a general formula for all mines is arbitrary and capricious and contrary to the proven approaches used by other agencies with far more experience than EPA in regulating the hardrock mining industry.

- That in several States, different regulatory agencies cover different aspects of mining, milling and processing, but together they provide complete coverage. This inter-agency approach works. A review of some of the reports of State hardrock mining regulatory and FA programs prepared by EPA's contractor indicates that the contractor did not consider the effectiveness of such inter-agency approaches.

Comment from The Honorable Darryl L. DePriest, Chief Council, Office of Advocacy, SBA at 4 (EPA-HQ-SFUND-2015-0781-1406) ("When Congress enacted CERCLA in 1980, there were few financial assurance requirements in either state or Federal regulations, and what requirements existed were largely untested.").

- That the Bureau of Land Management (BLM), the U.S. Forest Service (USFS) and the States have the authority and regulatory tools to address unanticipated events at any time. They adapt to changing conditions or circumstances to prevent the release of hazardous substances. They have the authority to require plan and permit modifications and increase or reduce FA as needed. This is the principle of adaptive management that is ignored in EPA's Proposed Rule.

- The fact BLM holds almost $3 billion and the USFS holds almost $1 billion and the States hold comparably large FA amounts, in addition to the value of long-term trust funds, that thoroughly cover not only land reclamation and closure but also post-closure water management, treatment, and monitoring. EPA has not demonstrated how these monies would not be sufficient to address any hazardous substance releases at currently operating or proposed mines.

- That a CERCLA §108(b) rule would be duplicative and completely overlap existing FLMA and State FA programs.

- That the expertise and experience to calculate FA for hardrock mines resides with the States and the FLMAs, and that EPA lacks this experience and expertise. The States and FLMAs have been calculating FA on a site-by-site basis for more than 25 years.

- That operators, in cooperation with the FLMAs and States, are in the best position to prevent the release of hazardous substances and to ensure adequate FA to protect the taxpayer.

- That a nationwide, one-size-fits-all FR standard is unworkable. It would be inappropriate, arbitrary and capricious to calculate FR at one site based on data from another site. There is no environmental support for a one-size-fits-all formula. It would be arbitrary to apply credits applicable at one site to a different site.

- That neither the FLMAs nor the States see any basis for EPA moving forward with CERCLA §108(b) regulations.

It is clear there would be substantial if not complete overlap between the FLMA and State programs and an EPA CERCLA §108(b) program based on the information provided by EPA, the FLMAs and States during the SBAR process. EPA's Proposed Rule reveals that it would completely duplicate existing programs. Contrary to EPA's position that CERCLA §108(b) regulations are significantly different as compared to existing Federal and State requirements for hardrock mining facilities, the FLMA and State regulatory and FA requirements ensure not only permit compliance, they also reduce the *degree and duration of risk associated with the production, transportation, treatment, storage, or disposal of hazardous substances* to minimal levels, and require sufficient FA to protect the U.S. taxpayer and the Superfund Trust Fund. There is nothing left for EPA to cover.

Given the comprehensive and robust hardrock mining regulatory and FA programs of the FLMAs and States, the burden is on EPA to show where and how a CERCLA §108(b) rule would not duplicate or preempt the State and FLMA programs. EPA must identify any gaps in the States' and FLMAs' hardrock mining regulatory and FA programs that would justify a CERCLA §108(b) FR rule. For the Proposed Rule, EPA has not identified any such gaps in existing programs and, as the record clearly indicates, EPA has not justified the proposed requirements.

When the SERs asked EPA to provide any site-specific example at active or proposed mining operations where a plausible hazardous release could occur that would not be addressed by existing programs, EPA could not do so. Instead, EPA has relied extensively on releases and clean-up actions at historic operations that do not represent current practice. The fact that such releases have not occurred and no Superfund liability has been generated over the past decade further places the burden on EPA to demonstrate why a new national program is required.

EPA's analysis of State regulatory and FA programs is woefully inadequate. This is demonstrated by the comprehensive analysis of State programs, *Review of State Financial Responsibility Requirements for Hardrock Mines and the Response Categories in EPA's CERCLA § 108(b) Proposed Rule,* prepared by Debra Struhsacker and SRK Consulting for NMA and attached to NMA's comments as Appendix A (AEMA incorporates this report by reference). The Struhsacker-SRK analysis clearly demonstrates there are no gaps and a CERCLA §108(b) FR rule would duplicate, and therefore preempt state programs pursuant to CERCLA §114(d). Again, EPA has failed to demonstrate where any specific State program could reasonably be judged to not provide adequate FA at specific sites.

EPA fails to recognize that establishment of appropriate FA requirements for a modern mining operation is a thorough, exhaustive, and facility- and site-specific process. Before even considering whether State FA requirements are adequate, EPA must first define the potential for uncontrolled releases that could trigger the need to access FA.

As a basic fact, mining companies generally work to design projects that minimize the potential for hazardous substance releases during operations and after closure. Mining companies rely on extensive in-house technical experts as well as outside consultants to select state-of-the-art practices to minimize risk, including in the fields of geotechnical and civil engineering, processing, hydrology and hydrogeology, and geochemistry among others. Moreover, such expertise is often specific to a particular region and certain climactic conditions. For example, tailings, waste rock, and leach facility design in remote areas of western Alaska is not comparable to design in the arid Southwest.

As indicated above, facility design is focused on not only operations, but also long-term closure and post-closure conditions. Overseeing the industry's work are experienced Federal and State agency mining program staff that review and permit projects. These agency staff, supplemented by expert consultants, bring similar expertise in ensuring that mines prevent hazardous substance releases during operations and after closure. The application of such specific industry and agency

expertise and technical knowledge has been directly responsible for the total lack of any releases at modern mining operations that have led to Superfund liability in the past decade.
In the Proposed Rule, EPA has established uniform national FA requirements and performance standards that run contrary to the currently successful site-specific approach. With all due respect to EPA, its Headquarters' staff and consultants do not have anywhere comparable technical or practicable experience in establishing or applying such standards. This point was emphasized in the Western Governors' Association Policy Resolution 2014-07, *Bonding for Mine Reclamation*:

> 2. Western states have a proven track record in regulating mine reclamation in the modern era – including for hard rock mines -- having developed appropriate statutory and regulatory controls, and are dedicating resources and staff to ensure responsible industry oversight.
>
> 3. In contrast, EPA currently has no staff dedicated to oversight of mine reclamation, or to the approval of bonding associated with mine reclamation. As a consequence, if EPA proceeds to promulgate bonding requirements for the hard-rock mining industry under CERCLA Sec. 108, it will have to create a new federal regulatory program -- an unnecessary investment of federal funds -- at a time when the federal government is trying to get its fiscal house in order.

In addition, EPA Headquarters intentionally chose not to consult with FLMAs, other Federal Agencies, State, and industry experts in determining performance standards. During the SBAR process, the SERs repeatedly requested that EPA staff visit mine sites throughout the U.S. to understand how existing programs work. EPA refused these invitations citing lack of time despite the fact work on the Proposed Rule had been ongoing for more than five years. As a direct result of EPA's decision to develop the Proposed Rule in a vacuum, EPA fails to provide any examples of where the uniform national performance standards minimize future liability risk. Additional comments on EPA's performance standards are provided later in this letter.

Existing FLMA and State FA programs are constantly being improved as the regulatory agencies and industry gain experience. This continuous improvement approach is a key element in these programs and is responsible for the significant increases in the FA amounts required by State and FLMAs over the last 25 years. The FLMA and State programs typically require updates to plans of operation and FA calculations on a periodic basis or more frequently when facility modifications are proposed. For example, the BLM reviews the "*amount and terms of the financial guarantee for each increment of your operations at least annually*"[11] or sooner if there is a modification to the plan of operation or the agency determines a need. The USFS Training Guide for Reclamation Bond Estimation and Administration states *"[T]o ensure the bond can be adjusted as needed to reflect the actual cost of reclamation, the FS should include provisions allowing for the periodic adjustment of bonds in the Plan of Operation prior to approval."*

In Nevada, each FA cost estimate must be updated at least every three years or any time a change is proposed. The fluid management permit program administered by Nevada requires permit

[11] 43 CFR §3809.553(b)

renewals every five years, which also triggers an update to the FA. As a specific permit condition for all large, hardrock operations in Alaska, mines must undergo a comprehensive third-party environmental audit, under State direction, every five years. These audits specifically include detailed review, and as needed, update of the mines' FA requirements. The review reports are posted on the Alaska Department of Natural Resources (ADNR) website, see http://dnr.alaska.gov/mlw/mining/largemine. Although specific timeframes for permit or FA updates are not included in all of FLMA and State programs, it is common practice that mine plans will change on a regular basis and each of these changes triggers a review and update of all permit conditions, including the FA calculations.

As noted above and in the attached White Paper, as well as in Appendix E attached to NMA's comments, EPA erroneously assumes that currently permitted and authorized to operate mines are operated in a manner similar to those that have become CERCLA sites. This assumption ignores the scope of the state and FLMA programs under which today's mines are required to operate. The FLMA and state mine regulatory and FA programs are specifically designed to ensure that mines are designed, constructed, operated and closed in a manner that avoids the types of problems that were caused by practices implemented by unregulated or under-regulated mines of the past.

EPA's CERCLA §108(b) rulemaking for hardrock mining and beneficiation is a classic "*solution in search of a problem*;" a problem that clearly does not exist. The hardrock mining States and FLMAs have comprehensive, robust regulatory programs in place that address FA requirements associated with mining and beneficiation, reclamation, closure and post-closure. The entire mining life-cycle is covered. Monitoring and regular inspections are part of these regulatory programs to ensure that FA is always kept current. These programs substantially reduce the risk of a release, and the current regulatory framework, including permits, monitoring, reporting and corrective action, assure that when releases do occur, they are promptly identified, reported and addressed under the supervision of regulatory authorities. EPA has placed several documents in the rulemaking record that reflect releases, but these reports are misleading because they overlook or fail to report the responses to the releases (*See* discussion on page 20.

The States and FLMAs have the expertise and staff to calculate the appropriate amount of FA based on unique site-specific circumstances and features (e.g., geochemistry), for each mining operation and to adjust FA as required over the life of the operation, including post-closure. These programs are designed to prevent the release of hazardous substances and ensure that sufficient FA is in place to ensure that the costs of taking remedial action do not fall to the federal Superfund program or the American taxpayers in the event of bankruptcy or an event that requires corrective action.

The fact no hardrock mining or beneficiation plan of operation approved by BLM or USFS since 1990 has been added to the CERCLA NPL demonstrates that the "*degree and duration of risk*" for hardrock mining is too small to regulate, thereby satisfying CERCLA §108(b)'s statutory mandate and EPA does not need to propose a national program. Because the existing FLMA and State programs cover CERCLA §107 liabilities, there is minimal to no benefit to the public or

the environment from a CERCLA §108(b) rule and significant regulatory burdens and costs on the industry, especially small entities. EPA has failed to demonstrate otherwise.

The Proposed Rule is an ill-advised proposal that imposes an enormous and unjustifiable burden on the U.S. hardrock mining industry because it duplicates existing state and federal FA requirements[12] for mine operators and provides little to no environmental benefit. Because existing State and federal FA programs[13] already require mine operators to provide substantial FA for their operations to ensure that mines are reclaimed and closed in a manner that protects the environment and shields taxpayers from exposure to future cleanup costs at today's mines, adding a superfluous layer of EPA FR is unwarranted. EPA should withdraw the regulations in the Proposed Rule and develop a Final Rule that establishes there is no need for another federal FR program for the hardrock mining industry.

Because EPA must provide "notice of its final action" by December 1, 2017 to satisfy a court-ordered deadline,[14] there is urgency for EPA to withdraw the regulations in the Proposed Rule and focus its attention upon developing a Final Rule that concludes that no additional FR is required for the hardrock mining industry and CERCLA §108(b)'s mandate has been satisfied.

The potential negative economic impacts of the Proposed Rule are a stark contrast to EPA's own estimate of the benefits to the American taxpayer - a meager $15.5 million each year. AEMA further contends that this estimate is actually an overestimate of the benefits since EPA has failed to provide a single example of currently operating mines where there is a risk of a hazardous substance release that could create substantive Federal Superfund liability. It is completely unclear how establishing extremely burdensome and highly duplicative program is justified given the very small projected benefits.

The Small Business Administration's Office of Advocacy's (Advocacy), comment letter (attached to these comments and incorporated by reference), provides further support for AEMA's position that the Proposed Rule is highly flawed, duplicative and burdensome. *See,* section 1 beginning on page 4 and section 3 beginning on page 8.

In summary, EPA will create at least an estimated $7.1 billion FA obligation for hardrock mining companies with no guarantee of instrument availability (see discussion in Section VII, *supra* on market capacity) – on top of them more than $3.5 billion of FA the industry already provides to the FLMAs and billions of dollars of additional FA provided to States.[15]

Finally, it is noteworthy that EPA indicated they did not adopt a site-specific approach to determining hazardous substance risk because it does not have the resources or capability to do

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[12] Also known as "bonding requirements."
[13] Two federal land management agencies ("FLMA"), the U.S. Bureau of Land Management ("BLM") and the U.S. Forest Service ("USFS") already have substantial FA requirements for hardrock mines.
[14] EPA must comply with the January 29, 2016 Order of the U.S. Court of Appeals for the District of Columbia in re: *Idaho Conservation League et al* No. 14-1149 ("Court Order"). The Order states, in part, "Although more is required with respect to hardrock mining than the other identified industries, where EPA retains discretion not to conduct a rulemaking at all, *EPA retains "discretion to promulgate a rule or decline to do so" even for the hardrock mining industry."* Order at p. 3 (emphasis added).
[15] As examples, Nevada regulators alone have $2.66 billion in FA; while Alaska's program currently maintains $844 million.

so. This is despite the fact the FLMAs and States are already doing so effectively. However, EPA contradicts its own approach in its proposed method for reducing or releasing FR. The Proposed rule provides that EPA Regional Administrators would determine, on a site-specific basis, when the reductions in risk merit partial or full release. Since there is no uniform methodology proposed for such releases or reductions, relying instead on each Region to determine the methodologies, and, as EPA acknowledges, because it does not have the resources to make such determinations, mining companies will not be able to assume any reasonable timeframe for releases or reductions and they will have to account for the FA requirements for an indefinite period. There is no reasonable basis for this requirement since the FLMAs and States are far more qualified, and they already do, make such determinations.

II. The Proposed Rule Qualifies for Elimination Pursuant to EO 13777 because CERCLA §108(b) FA is Duplicative, Burdensome, and EPA's Involvement is Unwarranted

A. EPA's Faulty Premise that CERCLA §108(b) Covers Something Different than Existing State and Federal FA Requirements Undermines the Need for the Rule

EPA's Proposed Rule to require FR for the hardrock mining industry is based on the faulty premise that CERCLA §108(b) FR would address environmental risks that differ from the environmental risks that existing State and FLMA FA programs already cover. The rulemaking record for the Proposed Rule clearly demonstrates the specious nature of EPA's position, which is internally inconsistent and based on faulty logic.

This record shows that today's hardrock mines are highly regulated and have robust FA as required under state and/or FLMA programs, and state and federal regulators have sufficient FA resources to respond to unpermitted future releases of hazardous substances from a hardrock mine in the event the owner fails to do so. EPA's Proposed Rule would create a superfluous FR program and cause unwarranted and unsupportable financial hardship for the hardrock mining industry and should thus be withdrawn in accordance with EO 13777.

EPA's assertion that CERCLA §108(b) covers something different than existing State and FLMA FA is based on a distinction without a difference. The State and FLMA FA programs fully address the exact same types of environmental risks and cover the identical mine features and on-site activities as the following thirteen Response Cost Categories that EPA developed in §320.63 of the Proposed Rule:

CERCLA §108(b) Proposed Rule Response Cost Categories:

- Solid/hazardous waste disposal
- Open pit
- Waste rock
- Heap/dump leach
- Tailings facility
- Process pond/reservoir

- Underground mine
- Slag pile
- Drainage
- Interim O & M
- Water Treatment
- Short-term O & M/Monitoring
- Long-term O & M/Monitoring

EPA's incorrect assertion that CERCLA §108(b) covers something different than existing State and FLMA FA programs blatantly contradicts EPA's simultaneous use of these supposedly different State and federal programs in two fundamental ways to determine program requirements. First, EPA uses existing FA requirements as the basis for calculating how much FR should be required for each category. Second, EPA proposes to allow coverage under these FLMA and State programs to reduce or eliminate CERCLA §108(b) FR obligations**.** *See,* for example, §320.63(c) of the Proposed Rule, which states:

> *Owners and operators may satisfy requirements of [the response components in] paragraph (b)(i) through (xiii), in whole or in part, by demonstrating that they are subject to, and in compliance with, requirements that will result in a minimum degree and duration of risk associated with the production, transportation, treatment, storage, or disposal, as applicable, of all hazardous substances present at that site feature. A demonstration under this paragraph will reduce the amount of financial responsibility that an owner and operator must demonstrate under this part.*

EPA's wholesale reliance on the environmental protection regulatory requirements and best management practices used at today's mines to determine and reduce or eliminate CERCLA §108(b) FR requirements renders the Proposed Rule internally inconsistent. EPA cannot have it both ways. The Agency cannot claim that existing state and federal reclamation and closure bonding programs cover something different than CERCLA §108(b) and simultaneously reverse this position by relying on these so-called "different programs" to satisfy FR requirements in the Proposed Rule.

EPA's contradictory position completely undermines EPA's premise for the Proposed Rule and proves that imposition of CERCLA §108(b) FR would duplicate the States' and FLMA's existing FA programs. The proposed duplication directly conflicts with EO 13777 as well as President Clinton's EO 12866 and President Obama's EO 13563. The proposed duplicative FR requirement places an enormous and unnecessary regulatory burden upon the hardrock mining industry, which also violates key objectives in EO 13777.

Advocacy's comment letter urges EPA to withdraw the Proposed Rule because EPA has not demonstrated any necessity for the Proposed Rule or justification for the economic hardships it would create:

> *The agency [EPA] has conspicuously failed to articulate a cohesive response to the argument that state and Federal rules address the same risks comprehensively.* (Advocacy letter at 3).
>
> *Although EPA states that these mining regulations are "distinct" from the CERCLA §108(b) requirements, this does not mean that the Federal and state mining requirements do not address the same response categories using other legal authorities and different language. An entirely duplicative CERCLA §108(b) financial responsibility program would be inconsistent with the "degree and duration" of risk associated with potential releases from current highly regulated and fully bonded hardrock mines. EPA is proposing an additive regulatory scheme in the absence of a clearly articulated need as to why these existing programs are deficient or require additional FA.* (Advocacy Letter at 5).
>
> *Advocacy strongly recommends that EPA withdraw this ill-advised proposal,* [which is] *without evidence that a problem exists warranting intervention…There is no statutory need for this regulation, nor are there any significant environmental benefits demonstrated by EPA…EPA is proposing a rule that would cost the industry $171 million annually for an annual savings to the government of $15.5 million by its own estimate, to address risks that are already addressed by state and Federal agencies.* (Advocacy Letter at 1 and 3).

Advocacy's January 2017 letter provides compelling reasons to withdraw the regulations in the Proposed Rule that also are consistent with the objectives in EO 13777. In compliance with the EO 13777 policy to eliminate unduly burdensome regulations, EPA must heed Advocacy's advice and withdraw this fatally flawed Proposed Rule, which is built on a defective and illogical foundation.

In light of the rulemaking record including comments filed on or before July 11, 2017 and EO 13777, EPA must write a Final Rule that reflects "adequate evidence has been demonstrated," and that there is no need for additional CERCLA §108(b) FR. The Final Rule should establish that there is no difference in the coverage provided by the existing States' and FLMAs' FA programs and the coverage in the Proposed Rule. Consequently, there is no demonstrated need for the regulations in EPA's Proposed Rule. Because EPA's rulemaking process has gathered substantial evidence of adequate FA to address potential future unpermitted releases of hazardous substances from hardrock mines, EPA has fulfilled the CERCLA §108(b)(1) statutory mandate to "establish and maintain evidence of financial responsibility." EPA should withdraw the regulations in the Proposed Rule and issue a Final rule that no additional FR pursuant to CERCLA §108(b) is required.

B. <u>The Proposed Rule Should be Withdrawn Because There is No Degree or Duration of Risk that Warrants the Rule's Regulatory Burden</u>

The Congressional directive in CERCLA §108(b) requires EPA to develop requirements for classes of facilities "to establish and maintain evidence of financial responsibility *consistent with*

the degree and duration of risk associated with the production, transportation, treatment, storage, or disposal of hazardous substances." (emphasis added). Consequently, the threshold question in evaluating the need for the Proposed Rule should focus on whether there is a substantial degree of unfunded risk associated with the hardrock mining industry and if so, what is the duration of that risk.

The rulemaking record for the Proposed Rule provides overwhelming evidence that the existing State and FLMA environmental protection rules and FA requirements for hardrock mining reduce risks to a very low level. Because there is minimal risk, the issue of the duration of the risk is nullified. As a result of the States' and FLMAs' regulations and FA requirements already governing hardrock mines and the resulting elimination of substantial or long-term risks associated with today's mines, there is no need for a CERCLA §108(b) FR Rule that applies to hardrock mines. The Final Rule must reflect this finding and establish that CERCLA §108(b) FR is not warranted. The rulemaking record, mining industry comments and the prohibition in EO 13777 against costly, outdated and unnecessary regulations that cost jobs and interfere with regulatory reform objectives mandate this outcome.

Because the States and FLMAs generally require FA for each of the thirteen CERCLA response categories for mine site features and mine site activities listed in Section II A, there are no un-bonded risks associated with today's mines. Consequently, there is minimal risk that operating hardrock mines will cause natural resource damage or adversely impact human health. Thus, there is no need for the Natural Resource Damages or Health Assessment cost categories included in the Proposed Rule.

Advocacy's January 2017 letter tells EPA there is no need for the regulations in the Proposed Rule because of the minimal level of risk associated with modern mines:

> *In sum, there is little evidence of a need for the proposed CERCLA §108(b) bonding program which EPA estimates to involve tens of billions of dollars. EPA's scheme would only potentially be justified if modern mines were facing the same type of remedial costs as previous legacy sites that did generate billions of dollars of costs. This rulemaking is not required by statute because the risk is minimal*. (Advocacy letter at 4).
>
> *The historical record does not support a determination of risk levels requiring new Federal involvement, especially when EPA has not refuted the assertion that certain regulatory programs provide coverage of the same response actions that EPA plans to cover (e.g., state and Federal mining regulations)*. (Advocacy letter at 17)
>
> *EPA simply describes evidence of recent releases, while not addressing the fact that the responses to these releases are potentially being handled effectively under the existing regulations. If other Federal and state programs adequately handle these releases, this would undermine, rather than support the foundation for this proposal*. (Advocacy letter at 7).

The evidence presented to the SBAR Panel, these and other mining industry comments, and compliance with EO 13777 require EPA to withdraw the unnecessary regulations in the Proposed Rule. Proceeding with the Proposed Rule would be arbitrary and capricious and violate each of the regulatory directives in EO 13777.

C. <u>There is No Gap - CERCLA §108(b) FR Duplicates Existing FLMA and state FA Requirements and is thus Inconsistent with Congressional Intent and EO 13777</u>

During the SBAR Panel convened in conjunction with the CERCLA §108(b) rulemaking, numerous SERs, state regulators, and the FLMAs provided substantial evidence that state and federal FA programs include comprehensive FA that covers reclamation, closure, <u>and</u> releases of hazardous substances. Advocacy's January 2017 letter to EPA cites input from the SERs that emphasizes this point:

> *The hardrock mining states and the federal land management agencies have comprehensive, robust regulatory programs in place that address FA requirements associated with mining and beneficiation, reclamation closure and post-closure issues. These programs substantially reduce, if not eliminate, the risk that a mine will have a release of hazardous substances…The FLMA's and state's comprehensive, robust regulatory programs are designed to prevent the release of hazardous substances and assure sufficient FA is in place to protect the taxpayer in the event of bankruptcy or an event that requires corrective action.*
>
> *EPA appears to hold the position that somehow the existing federal and state FA programs deal solely with traditional reclamation and mine closure activities (e.g., recontouring and revegetating disturbed areas). This position is incorrect. The existing regulatory requirements for hardrock mining go far beyond reclamation and closure and include many provisions designed to protect the environment. Consequently, they include measures to prevent releases of contaminants from operating and closed mines that would come under the CERCLA 107 hazardous substances definition.* (Advocacy letter at 5 – 6).

Throughout the CERCLA §108(b) rulemaking, EPA has not pointed to any shortcomings or gaps in any of the State or FLMA FA programs. To the contrary, EPA's reliance on existing State and FLMA FA to form the basis for FA amounts for each response category, and reduce or eliminate the need for CERCLA §108(b) FA, indicates EPA places sufficient confidence in these existing FA programs to determine that they supplant the need for CERCLA §108(b) FR.

The December 2016 SBAR Panel Report published by EPA, Advocacy, and the Office of Management and Budget/Office of Information and Regulatory Affairs ("OMB") states that the CERCLA §108(b) FR program is designed to: "…fill the gap where other regulations fail to prevent releases or threatened releases of hazardous substances"[16] (SBAR Panel Report at 9) but

[16] Final Report of the Small Business Advocacy Review Panel on EPA's Planned Proposed Rule, Financial Responsibility Requirements for the Hardrock Mining Industry Under CERCLA § 108(b), December 1, 2016.

EPA has not pinpointed any gaps that need to be filled. EPA is thus making an unsubstantiated claim that the States' and FLMAs' FA programs are different, inadequate, or both without providing any explanation whatsoever of why the States' and FLMAs' FA programs do not address the same types of releases of hazardous substances as those the Proposed Rule purports to cover.

Appendix A[17] of the SBAR Panel Report is a lengthy table prepared by one of the SERs that lists the CERCLA Response Categories in the Proposed Rule and shows that the FA requirements for mines in Nevada and on BLM-administered federal lands provide complete FA for the mine features and activities that are identical to EPA's Response Cost Categories[18]. Advocacy's January 2017 letter states that an analogous table can be produced documenting FA covering the CERCLA Response Cost Categories for mines on National Forest System lands administered by the USFS. (Advocacy letter at 6). The obvious redundancy of the Proposed Rule, which is shown so clearly in this table, proves this rule is unnecessary.

In its January 2017 letter to EPA, Advocacy found that the Proposed Rule would duplicate the existing states' and FLMA's regulatory and FA requirements:

> *Both BLM and USFS have effective and comprehensive FA requirements that extend far beyond reclamation (i.e., earthworks and revegetation) and can include long-term FA for sites where warranted...The Federal Land Management Agencies (FLMA) and state agencies have existing comprehensive bonding and regulatory requirements that would be duplicated by every response requirement that EPA intends to address under CERCLA §108(b).* (Advocacy letter at 5).

EPA's failure to demonstrate any gaps or problems with the existing States' and FLMA's FA programs means EPA has not shown there is a need for the Proposed Rule and cannot justify the enormous costs associated with the Proposed Rule. Consequently, EPA must withdraw the regulations in the Proposed Rule, and develop a Final Rule that establishes that there is no requirement for additional FR pursuant to CERCLA §108(b) for the hardrock mining industry.

As a result of the rulemaking for the Proposed Rule and the SBAR Panel process, EPA has conclusive "*evidence of financial responsibility consistent with the degree and duration of risk associated with the production, transportation, treatment, storage or disposal of hazardous substances*" as mandated by CERCLA §108(b)(1). Because there is overwhelming evidence that the States and FLMAs already have FA for hardrock mines that is sufficient to address future releases of hazardous substances, promulgation of a Final Rule requiring additional FR pursuant to CERCLA §108(b) would be arbitrary and capricious, and conflict with EO 13777.

[17] Appendix A from the SBAR Panel Report is included herein as Appendix B.
[18] Nevada, BLM, U.S. Forest Service, and other states use the Standardized Reclamation Cost Estimator ("SRCE") software to calculate reclamation costs that uses detailed site-specific factors and engineering cost estimates.

III. The Costs of the Proposed Rule Far Outweigh the Benefits

As clearly articulated in Advocacy's January 2017 letter, there is essentially no financial benefit associated with the Proposed Rule, which EPA projects will cost the hardrock mining industry between $111 to 171 million each year – and save the federal government $527 million over 34 years – only $15.5 million per year. As indicated above, and in Section VII below regarding market capacity, the cost is likely underestimated while the benefit is likely overestimated. Obviously, there is no meaningful public or environmental benefit associated with the Proposed Rule – which costs so much and accomplishes so little.

In addition to the economic hardships the Proposed Rule would impose on the mining industry, it would also create adverse socioeconomic impacts in mining states where mining jobs will be lost due to the premature closure of mines that cannot withstand the added FA burden. Our Nation's reliance on foreign sources of strategic and critical minerals necessary for national defense, manufacturing, infrastructure, and the everyday products of modern society will increase dramatically, putting America at risk.

Advocacy's letter critiques EPA's cost benefit analysis saying that EPA has grossly overestimated the rule's benefits. Advocacy found that EPA has overestimated the number of bankrupt companies that will incur a CERCLA response cost, has inflated EPA's response costs, and has assumed that CERCLA §108(b) FR will be used to fund a response at too many sites:

> *Based on [Advocacy's] conservative estimates, the estimated benefits of Option 1 of EPA's proposed rule in terms of reduced Government Costs would drop from EPA's $527 million estimate to $13.2 million [over a 34-year period]. When compared to 34 years of EPA's estimate of Option 1 annual FA responsibility expenditures ($171 million/year), the cost/benefit ratio demonstrates the huge inefficiency of EPA's regulatory approach…This comparison is just another way to appreciate the inappropriateness of this proposal, even if one ignores the flaws in the formula methodology. The EPA scheme, in effect, is a huge transfer between mining firms and the FA industry with comparatively small benefits to the public*. (Advocacy letter at 16).
>
> *EPA is proposing a rule that would cost $171 million annually by its own estimate, to address risks that are already addressed by state and Federal agencies. Given the minimal remaining risks, the statute does not require any regulation under CERCLA 108(b) to address the hardrock mining industry. EPA also greatly overstates the benefits of this rulemaking by failing to incorporate valid estimates of the incremental impact of the proposed rule. When properly evaluated, the costs of the proposed action far outweigh the benefits.* (Advocacy letter at 17).

In the preamble to the Proposed Rule, EPA admits that CERCLA §108(b) FR may not be necessary: "*…there could be an associated risk that the rule will potentially require financial*

responsibility that may never be required.[19]" This stunning admission demonstrates the Proposed Rule is arbitrary and capricious; there can be no justification for proposing such a costly rule that may never be needed. EPA's proposal to impose, at a minimum[20], a $7.1 billion superfluous CERCLA §108(b) FR program on the hardrock mining industry is completely untenable. The arbitrary and capricious nature of this unnecessary rule are compelling reasons why EPA must withdraw the regulations in the Proposed Rule and issue a Final Rule that finds there is no justification for proceeding with the Proposed Rule. The Final Rule should establish that there are no meaningful public or environmental benefits associated with the Proposed Rule, the estimated costs to the mining industry are not justifiable, and the loss of mining jobs and adverse socioeconomic impacts are unacceptable.

IV. The Proposed Rule is EPA's Attempt to Become the "Super Regulator" of Hardrock Mining

To address largely hypothetical risks, the Proposed Rule would impose extraordinary financial burdens that almost entirely duplicate similar measures already in place. Worse still, because of EPA's own lack of capacity, the best EPA could do in the Proposed Rule was to adopt a crude, one-size-fits-all formula that wholly ignores dramatically different site-specific circumstances among mining operations, yielding truly extraordinary (and unnecessary) sums of FR to be required. Indeed, EPA did not merely ignore site-specific conditions in determining its preferred methods of reclamation/remediation and control of hazardous substances at particular sites, it explicitly disavowed any intention, or even the capacity, to conduct any site-specific analysis.

Rather than consider whether, in light of this admitted lack of capacity, it might be prudent not to act, EPA instead developed its own generic formula for calculating mine FR requirements from whole cloth. This superficial approach uses a very small number of parameters, ignores many highly relevant site-specific conditions, and then assigns an estimated cost for each mine by scaling EPA's estimates for those individual features (such as tailings facilities, open pits, waste rock facilities and process ponds) to the sizes of currently operating facilities.

It is illustrative to evaluate this approach compared to the methodologies used by the FLMAs and States that have been developed over time. These government agencies consistently have shown that FA should be calculated on a region-by-region, site-by-site basis. They base their approaches on many years of regulating the mining industry and ensuring that adequate FA is available to prevent and address releases. It is clear that EPA staff brought no such experience to determine the methods for FR determinations in the Proposed Rule. In setting these FR amounts, EPA also made the astonishing and unjustifiable assumption that *every one of those features/categories* will require a CERCLA response *at every mine site* as the basis for establishing an extraordinarily large pool of contingency funds. No qualified mining expert would find EPA's conclusion justified from a technical perspective, and the administrative

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[19] FR at 3463
[20] *See* Freeport-McMoRan comment letter dated May 5, 2017, at page 3, "a more representative value from EPA's regulatory impact analysis yields a figure of $15.7 billion.

record developed in support of the Proposed Rule contains nothing to justify such unreasonable assumptions.

Faced with the excessive financial responsibility requirements of the Proposed Rule, many mines, and perhaps most, will be forced to qualify for EPA's crediting program or face going out of business. This will involve compliance with the technical performance standards provided for each response category. Again, mining companies generally design their operations to minimize the potential for releases and risks to the environment. The FLMAs and States then utilize their expertise to determine the adequacy and potential risks of specific designs. In many cases, technical requirements are established in FLMA and State regulatory programs. However, based on experience, there is a general recognition that a "one size fits all" approach does not work. Specific examples of the inappropriate elements of EPA's proposed performance standards include:

- *For open pit categories, EPA proposes that structures that are considered to be critical structures to be designed for a long-term static factor of safety of 1.5 or greater, structures that are considered to be non-critical structures to be designed for a long-term static factor of safety of 1.3 or greater, units being closed be designed for a factor of safety of 1.1 or greater under pseudostatic analysis.*

  Many government agencies have chosen not to define specific safety-factors allowing such determinations to be made a on site-specific basis. Moreover, in a large pit, it is highly relevant whether such a requirement would apply across the entire pit or in small, localized areas. Exact determinations of appropriate post-closure stability requirements are often made as data are collected when pits are operational – balancing the need for stability with mining economics. For EPA to usurp the authority of existing programs without any practicable knowledge or experience in open pit design or any clear evidence that this requirement is needed beyond existing programs to minimize risk, is arbitrary, capricious, and without merit. Moreover, it interferes with mining companies' abilities to determine how best to economically mine a deposit. Note this comment also applies to the stability requirements for the waste rock and heap leach response categories.

- *For waste rock category, for existing units, the plan must provide for permanent stormwater conveyances, ditches, channels and diversions designed to convey the peak flow and ponds and other collection devices designed to store the volume generated during a 24-hour period by a 100-year return interval storm event. For units that become authorized to operate after [insert the effective date of the Final Rule], the plan must provide for controls designed to store the volume generated during a 24-hour period by a 200-year return interval storm event... In addition, a plan for the minimization, prevention, or collection and treatment of discharges and/or seepage, based on site hydrology and water quality characterization information, that provides for a cover system of, at a minimum, a store and release earthen cover system with a thickness of at least twelve inches and, if necessary, additional source controls or capture and treatment at closure, all of which meet a minimum 200-year life design criteria.*

  Here again, EPA has proclaimed its view of appropriate cover and water management system designs without indicating why existing programs are inadequate to address risk.

Mining companies, under the oversight of FLMAs and States establish site-specific closure designs for waste rock facilities based on local geochemistry, hydrology, hydrogeology, and geotechnical conditions and the surrounding environmental that could be impacted. There is absolutely no basis for setting rigid national standards or design criteria for water management and cover systems where facilities have site-specific water management plans and associated FA that are protective. EPA has not made any compelling argument why such local, site-specific closure requirement determinations are not working to justify why mines should be forced to implement unproven, rigid national standards.

- *For the tailings category, EPA requires a plan to regrade surface during closure to a stable configuration that prevents ponding and promotes the conveyance of surface water off the unit, and that requires closure of all tailings impoundments and stacks considered to be critical structures to be designed for a long-term static factor of safety of 1.5 or greater and all non-critical structures to be designed for a long-term static factor of safety of 1.3 or greater; and requires that the units being closed be designed for a factor of safety of 1.1 or greater under pseudostatic analysis.*

  The Proposed Rule also appears to require that tailings facilities be covered to avoid the need for FR for this category. Tailings dams are typically regulated by FLMA geotechnical experts and State dam safety engineers. These individuals understand the specific requirements needed to ensure long-term dam stability. They generally allow site-specific demonstrations of the appropriate levels of stability to prevent dam failure. Similarly, mines must propose water management systems to ensure that water is not released that does not meet applicable standards. For this category, EPA has defied the proven approaches followed by existing programs with highly prescriptive requirements that are not based on any proven example of reducing environmental risk. AEMA specifically challenges EPA to provide a single example of substantive dam failure risk at a currently operating or proposed hardrock mining operation.

Similar arguments can be made about all of the proposed performance standards. Existing FLMA and State programs address each of the categories in a manner that ensures proper site-specific designs to minimize risk with appropriate FA to guarantee implementation. EPA does not (and cannot) cite a single operating mine where its requirements would address a Superfund liability risk not covered by existing programs.

As discussed above, EPA fails to justify the need for the regulations in the Proposed Rule by demonstrating any actual cases where currently operating or proposed mines are posing unacceptable risk of hazardous substance releases and potential creation of Superfund liability. Recognizing this weakness, EPA tries to make broad generalizations about supposed other environmental benefits of the rule without any supporting evidence. At a broad level, throughout the Proposed Rule and supporting documents, EPA again and again equates “risk” with the occurrence of a “release” [and other inappropriate risk surrogates]. This misleadingly fails to acknowledge that that the mere existence of releases is inadequate to demonstrate that any meaningful risk exists.

One clear example of EPA's misstatements of the supposed benefits of Proposed Rule is the following reference:

> *Waterways identified as impaired waters by section 303(d) of the Clean Water Act (CWA) and waters identified as wild and scenic rivers under the 1968 Wild and Scenic Rivers Act may benefit the most from improved environmental performance. Adverse impacts to waterbodies may be reduced or avoided in accordance with improvements in the environmental performance of mines.*

While some historic mining clearly contributed to water quality impairment, modern mining operations are required to comply with Clean Water Act provisions. The suggestion that modern mines will not comply and the Proposed Rule will lead to a better level of compliance is completely unsubstantiated. There is no evidence of any requirement in the Proposed Rule improving water quality at mines or surrounding watersheds.[21]

Next, EPA tries to use its findings from the Agency's National Enforcement Initiative (NEI): *Reducing Pollution from Mineral Processing Operations* to justify the benefits of the Proposed Rule. Like the CWA reference, EPA broadly states that its inspections have found significant non-compliance with hazardous waste and other environmental laws. It goes on to further indicate that the mineral processing and mining sectors generate more wastes that are corrosive or contain toxic metals than any other industrial sector. It is reasonable to debate EPA's findings on hazardous waste statute and regulatory compliance but EPA does not demonstrate that such non-compliance is not being addressed by existing regulatory and FA programs and these sites pose a risk of Superfund liability at modern mining operations. EPA's failure to establish a link between alleged non-compliance and the Proposed Rule requirements further demonstrates the fundamental weakness in its justification for the Proposed Rule.

EPA also misleadingly cites Toxic Release Inventory (TRI) data as justification for the Proposed Rule. EPA cites 2013 TRI data that indicates that the metal mining industry (e.g., gold ore mining, lead ore and zinc ore mining, and copper ore and nickel ore mining), reported quantities of onsite releases of hazardous substances, averaging nearly 1.7 billion pounds per year. EPA acknowledges that these numbers in no way represent actual risk of release to the environment. In fact, much of this volume relates to waste rock managed on-site that has little or no potential to cause a hazardous release or risk. Moreover, EPA recognizes that the TRI data is generally related to releases that are permitted under existing State and Federal law. However, EPA suggests that the mere presences of these materials in the mining industry somehow equates to environmental risk and potential Superfund liability. This is like saying because a rock in your backyard has some copper in it, it could cause a hazardous substance release for which you

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[21] AEMA anticipates that the anti-mining organization Earthworks (or another environmental NGO) may place into the rulemaking record a 2006 report prepared by Ann Maest and Jim Kuipers, *Comparison of Predicted and Actual Water Quality at Hardrock Mines – the Reliability of predictions in Environmental Impact Statements.* This report and its conclusions were debunked by Schlumberger Water Services in 2013, *Technical Review of Kuipers Maest 2006, Comparison of predicted and actual water quality at hardrock mines: The reliability of predictions in Environmental Impact Statements.* Among the findings of the Schlumberger review are that the conclusions in Maest Kuipers are not relevant to any current mines being permitted today; the conclusions regarding water quality exceedences could not be validated; and that the data set primarily focused on historical sites and sites permitted during the transition from an unregulated activity to modern regulations. This report is included with these comments and incorporated by reference.

should provide FR. Most strikingly, EPA provides no examples correlating TRI data to actual releases that triggered Superfund liability at modern mines. That is because it cannot do so.

Finally, having failed to demonstrate any financial justification for the Proposed rule or any evidence that environmental risks are not addressed adequately by existing programs, EPA states that the Proposed Rule will yield vague benefits in terms of changes in behavior among mining operations. Again, the theory is that because the mining industry caused issues in the past (pre-environmental statutes), it must not be environmentally responsible today, and, therefore, a burdensome, unsupported FR program is necessary. The mining industry is one of the most regulated and scrutinized industries in the U.S. To suggest that it behaves poorly compared to other industries is unsupported and offensive to AEMA's members that are committed to protecting the environment. This is clearly evidenced over the past decade by the lack of any tangible impacts from modern mining operations on human health or ecological systems. Overall, EPA has not demonstrated any linkage between the Proposed Rule and changes in behavior that would reduce risk.

In establishing the performance standards and the fiscal necessity to comply with them, EPA is effectively using the "financial responsibility" provisions of CERCLA §108(b)—a statute that says nothing about mines or mining—as statutory authority to establish itself as the super-regulator of hardrock mining in the United States, thereby usurping the authority of FLMA and State regulators that EPA itself concedes to have greater capability to evaluate such issues. Neither section 108(b) nor any other act of Congress has delegated that authority to EPA. In setting national criteria without regard to site-specific differences in such critical areas as geology, climate, hydrology, seismology, and ecology, EPA will be requiring mines to incorporate inflexible measures that a number of States have rejected for sound technical reasons, either as not needed or as affirmatively inferior to other options. EPA's approach will increase the costs to build and operate mines without providing an environmental benefit. As a result, a number of mines will be forced to prematurely close and new mines won't be built.

V. EPA's Flawed Formula

As more fully explained in the document prepared by SRK Consulting entitled *Review of Cost Estimate Formula for EPA's CERCLA §108(b) Proposed Rule* (marked as Appendix B to NMA's Comments and incorporated herein by reference), EPA's approach to estimating FR is fundamentally flawed. From a conceptual standpoint, EPA's reliance upon a generic, one-size-fits-all formulaic approach based on limited input variables and using statistical manipulation to estimate FR costs is a highly inaccurate, outdated and overall erroneous approach. The assumption that one formula can produce valid estimates of the cost of response actions for any facility type on any hardrock mine site is unreasonable. This generic approach does not consider critical, site-specific conditions that can profoundly affect the cost of such actions. For example, sites located in semi-arid environments will have a number of lower cost options available for management of solutions at the site. Likewise, the presence or absence of acid generating rock at a site can have a significant impact on site objectives, and therefore, the actions taken to achieve those objectives.

In contrast, the federal and state regulatory agencies began requiring site-specific closure and reclamation cost estimates to calculate FA obligations nearly 30 years ago, after abandoning the overly simplistic formulaic approach previously used. The change was based upon actual experience with mine design, operations and closure, which showed that simplistic approaches would not provide accurate cost estimates, sometimes seriously underestimating closure and reclamation costs. For example, prior to 1989, mine sites in Nevada were only required to post FA of $2,500 per acre, an arbitrary amount that subsequent experience by the agencies and the mining industry was shown to be wholly inadequate[22].

Although some international jurisdictions still use this type of overly simplistic method for FA estimates, jurisdictions with mature mining industries and advanced regulatory programs have abandoned, or are abandoning this approach in favor of requiring site-specific closure cost estimates.

VI. The Proposed Rule Must be Rejected because it Violates Numerous Executive Orders

As described below, EPA's Proposed Rule violates specific directives in Executive Orders (EOs) issued by Presidents Clinton, Obama, and Trump. Proceeding with the Proposed Rule is unjustifiable because of these violations.

A. President Clinton's Executive Order 12866

In September 1993, President Bill Clinton issued Executive Order ("EO") 12866 – Regulatory Planning and Review stating:

> *The American people deserve a regulatory system that works for them, not against them: a regulatory system that protects and improves their health, safety, environment, and well-being and improves the performance of the economy without imposing unacceptable or unreasonable costs on society; regulatory policies that recognize that the private sector and private markets are the best engine for economic growth; regulatory approaches that respect the role of State, local, and tribal governments; and regulations that are effective, consistent, sensible, and understandable. We do not have such a regulatory system today.*[23]

EPA's Proposed Rule does not comply with numerous aspects of EO 12866 including the requirement that rules use the most cost-effective option to achieve regulatory benefits, impose the least regulatory burden, avoid duplicating existing rules, harmonize federal regulations with State, local, and tribal regulations, and consider alternatives.

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[22] Although some states still use cost/acre as a regulatory guideline, those regulations require consideration of other site-specific factors and regulators have the discretion to consider other factors, and may increase the total bond above the guideline, if needed.
[23] http://www.presidency.ucsb.edu/ws/?pid=61560

In violation of EO 12866, EPA's Proposed Rule works against the interests of the U.S. mining industry and the broader best interests of our Nation that require mined materials for our infrastructure, our technology, our transportation, our defense, our security, and for all other aspects of modern life. The Nation's interests would be best served by developing domestic sources of such minerals.

The Proposed Rule violates EO 12866 because it places an enormous financial burden on the hardrock mining industry that will diminish the domestic production of minerals, cost U.S. mining jobs, and impose "unacceptable or unreasonable costs on society." The Proposed Rule also violates EO 12866 by failing to "respect the role of State, local, and tribal governments." Moreover, the Proposed Rule violates the 12 Principles of Regulation specified in EO 12866 as shown in Table 2.

Table 2
The Proposed Rule Contravenes Executive Order 12866 Regulatory Principles

EO 12866 Regulatory Principles	Proposed Rule Contraventions
Identify the problem to be solved	There is no problem. Adequate FA already provided by States' and FLMAs' FA programs, eliminating the need for the Proposed Rule.
Examine existing regulations	Existing States' and FLMA's regulations and FA programs eliminate the need for the Proposed Rule
Identify and assess alternatives to regulations	Relying on existing States' and FLMAs' FA programs is an obvious and viable alternative.
Consider the degree and duration of risks	There is minimal risk because the States' and FLMAs' regulatory and FA programs largely eliminate risks.
Use most cost-effective options to achieve the regulatory objective	States' and FLMAs' programs provide cost-effective FA for each CERCLA response category
Determine if benefits justify the costs	The Proposed Rule estimates minimal public benefits (no more than $15.5 million per year of savings to the government) at an enormous and unjustifiable cost to industry of at least $171 million per year.
Use best available information to determine the need for and consequences of proposed regulations	The numerous documents in the docket pertaining to legacy sites are irrelevant to the Proposed Rule, which governs current mining operations – not legacy sites. Similarly, CWA, TRI, and enforcement statistic data have no direct applicability to the Proposed Rule. The Proposed Rule should be based on information provided by the SERs, States, and FLMAs during and after the SBAR Panel process.

Table 2
The Proposed Rule Contravenes Executive Order 12866 Regulatory Principles

EO 12866 Regulatory Principles	Proposed Rule Contraventions
Identify and assess alternative forms of regulation	Existing States' and FLMAs' FA programs reduce or eliminate the need for the Proposed Rule[24]
Harmonize federal regulations with State, local, and tribal regulations and functions	Proposed Rule is dismissive of and incongruent with State, local, and tribal regulations and functions
Avoid regulations that are duplicative, inconsistent, and incompatible with other federal regulations	Proposed Rule duplicates and is incompatible with existing States' and FLMAs' regulations and FA programs
Impose the least burdensome regulations including cumulative regulations	EPA estimates the Proposed Rule would create a $7.1 billion FA requirement and burden the mining industry with $171 million annual costs on top of existing FA requirements. It further assumes the availability of FA instruments to satisfy the requirements. Given EPA's own documented uncertainties in this assumption, the actual costs could be much higher and potentially devastating to the industry. As indicated by Advocacy's letter, the benefits are likely significantly overestimated and could be less than $1 million per year.
Minimize the potential for litigation	Per CERCLA §114(d), the Proposed Rule would preempt existing States' FA and result in litigation.

In compliance with EO 13777, EPA must write a Final Rule that is consistent with the Regulatory Principles in EO 12866. The Final Rule must recognize that a strong domestic hardrock mining industry is essential to the economic, defense, and security interests of the Nation. The Final Rule must reject the regulations in the Proposed Rule as being duplicative and unwarranted and find that the existing States' and FLMAs' regulatory requirements and FA programs eliminate risks, thereby rendering CERCLA §108(b) FR unnecessary.

B. President Obama's Executive Order 13563

It is ironic that the Obama administration's Proposed Rule violates President Obama's January 2011 EO 13563, "*Improving Regulation and Regulatory Review*." EO 13563 supplements and reaffirms the principles in President Clinton's EO 12866 and requires federal regulations to comply with EO 12866. EO 13563 recognizes that some industry sectors are subject to numerous regulations that may be redundant, and requires elimination of regulatory redundancies to reduce regulatory burdens.

[24] As discussed in Section II A, EPA's reliance on existing States' and/or FLMAs' FA to reduce or eliminate the need for CERCLA § 108(b) FA clearly demonstrates the Proposed Rule is unnecessary.

EO 13563 directs federal agencies to "…identify and use the best, most innovative, and least burdensome tools for achieving regulatory ends [and] take into account benefits and costs. This EO acknowledges, "Some sectors and industries face a significant number of regulatory requirements, some of which may be redundant, inconsistent or overlapping…" and requires federal agencies to "identify and consider approaches that reduce burdens."

In compliance with President Trump's EO 13777, EPA must withdraw the regulations in the Proposed Rule as currently drafted and develop a Final Rule that complies with President Obama's EO 13563 and President Clinton's EO 12866. As mandated by the Clinton, Obama, and Trump EOs, EPA's Final Rule must not unduly burden the hardrock mining industry, must appropriately weigh costs and benefits, and eliminate redundancy by recognizing that the States and FLMAs already have substantial FA programs that make an EPA program unnecessary.

C. President Trump's Executive Orders

In addition to EO 13777, President Trump has issued other EOs that are directly relevant to the Proposed Rule. The directives in these EOs require EPA to withdraw the regulations in the Proposed Rule. Two such EOs, EO 13771 and 13783, are discussed below.

President Trump's January 30, 2017 EO 13771, "*Reducing Regulation and Controlling Regulatory Costs*," establishes that it is the policy of the executive branch to be prudent and financially responsible in the expenditure of both public and private sector funds. In addition to managing the direct expenditure of taxpayer dollars, this EO requires federal agencies to control the financial burdens that compliance with federal regulations imposes upon the private sector.

To accomplish this objective, EO 13771 requires federal agencies to eliminate at least two existing regulations prior to promulgating any new regulations. It also mandates a net-zero cost to the regulated community in which the cost of new regulations must be offset by eliminating existing regulations that create equivalent cost burdens.

This EO has important fiscal implications for a future CERCLA §108(b) rule because before EPA can promulgate regulations under a Final Rule or determine that no such regulations are necessary (as it must to comply with the Court Order), the Agency would have to repeal two or more existing regulations to meet the net-zero cost savings mandate. If EPA were to proceed with the Proposed Rule as written, the Agency would have to repeal two or more regulations that cumulatively impose $171 million in annual private-sector costs to offset EPA's projected costs of the Proposed Rule.

EO 13771 also requires agencies to submit Regulatory Plans pursuant to EO 12866 and include any new rule approved during the Presidential budget process in the Unified Regulatory Agenda. Notably in the case of the Proposed Rule, EPA's internal memorandum regarding the President's FY 2018 budget specifically prohibits EPA from using any funds to finalize the regulations in the Proposed Rule: "None of the funds made available are to be used to finalize or enforce the proposed CERCLA 108(b) rulemaking on the hardrock mining industry, as the rule is currently written." This prohibition does not prevent EPA from issuing a **No Rule Final Rule.** EO 13771

and EO 13777 work hand-in-hand to reduce regulatory burdens. Considering the requirements in both of these EOs, it is clear that EPA must withdraw the regulations in the Proposed Rule.

A third EO, President Trump's March 28, 2017 EO, "Promoting Energy Independence and Economic Growth" (EO 13783), similarly requires EPA to reject the regulations in the Proposed Rule. This EO states that it is in the Nation's interest to develop a broad array of domestic energy resources including coal, natural gas, nuclear, hydropower, and renewable energy sources. This EO also establishes that the Nation's electricity must be affordable, reliable, safe, and secure and that it be produced from domestic sources.

EO 13783 requires agencies to avoid creating regulatory burdens that unnecessarily encumber energy production, constrain economic growth, and prevent job creation. The Proposed Rule directly thwarts these objectives because it substantially burdens – and may even curtail altogether – the future production of energy from hardrock minerals like lithium and uranium; the distribution of energy which requires copper, gold, silver, zinc and other hardrock minerals; and the development of solar and wind renewable energy sources, which require rare earths, copper, gold, silver, and other hardrock minerals.

EO 13783 directs all executive branch departments and federal agencies to conduct an immediate review of regulations that potentially burden the development of domestic energy resources and suspend, revise, or rescind those that unduly burden the development of domestic energy sources. As shown in Table 3, the Proposed Rule violates several aspects of EO 13783. EPA must withdraw the regulations in the Proposed Rule in order to comply with EO 13783.

Table 3
Proposed Rule Contravenes Energy Independence Executive Order 13783

EO 13783 Energy Independence Directives	Proposed Rule Contraventions
Avoid regulatory burdens that unnecessarily encumber energy production	The onerous and duplicative FA requirements will interfere with and potentially eliminate the development of domestic deposits of lithium and uranium, two important energy resources
Ensure the affordability, reliability and safety of the Nation's electricity, by developing domestic coal, natural gas, nuclear, hydropower, and renewable energy resources	The Proposed Rule directly threatens the affordability and reliability of the Nation's electricity by imposing a substantial financial burden on the domestic producers of energy minerals used to produce and distribute conventional and renewable sources of electricity.
Require environmental regulations to have a greater benefit than cost	EPA projects the Proposed Rule will cost mining companies a minimum of $171 million per year while providing no more than a meager $15.5 million in annual taxpayer savings, which clearly violates this cost benefit mandate.

EPA must withdraw the regulations in the Proposed Rule because they violate EOs from three administrations: 12866, 13563, 13771, 13777, and 13783, and write a Final Rule by December 1, 2017 in order to comply with the Court Order. The Final Rule also must comply with the directives to avoid duplicative regulations, alleviate regulatory burdens, achieve a cost benefit, and not impede domestic energy production in the EOs listed above. The only Final Rule that will comply with these EOs is a Final Rule concluding that no additional FR pursuant to CERCLA §108(b) is required for hardrock mining.

The Court's January 29, 2016 opinion in *Idaho Conservation League et al* ("Opinion") provides EPA with broad discretionary authority regarding the scope and content of the rule – or even whether to issue a rule at all. EPA can thus satisfy the Court Order by developing a Final Rule that also complies with the EO regulatory directives.

> *...the proposed joint order*[25] *"does not require EPA to promulgate a new, stricter rule... At most, it merely requires that EPA conduct a rulemaking and then decide whether to promulgate a new rule — the content of which is not in any way dictated by the proposed order on consent — using a specific timeline...EPA retains discretion to promulgate a rule or decline to do so... The joint motion on consent states that "[n]othing in this Joint Motion should be construed to limit or modify the discretion accorded EPA by CERCLA or the general principles of administrative law.* (Opinion at 17, internal citations omitted.)
>
> *...the joint motion does not preordain the content of a rulemaking much less indicate that in committing itself to conducting a rulemaking EPA has prejudged the outcome for the hardrock mining industry.* (Opinion at 20)

Thus, pursuant to the Opinion, EPA has full authority to determine that CERCLA §108(b) FR is not necessary and therefore to issue a Final Rule that states no rule is warranted. EPA can readily justify this "No Rule" Final Rule based solely on the overwhelming data that the SERs, States, and FLMAs provided during the SBAR Panel process that document there are no un-bonded risks associated with the hardrock mining industry that justify a CERCLA §108(b) FR requirements. The comments filed during this comment period provide overwhelming additional support for that premise. **A No Rule Final Rule would be the best way to conform to congressional intent and satisfy all of the regulatory directives in the Clinton, Obama, and Trump EOs**.

VII. The Proposed Rule's Regulatory Burden Violates EO 13777 because there is Insufficient Market Capacity to Respond to the Proposed Rule's FA Demand

In response to a Congressional directive in the FY 2016 Conference Committee Report, EPA performed an analysis of the availability of FA instruments to satisfy the demand that a

[25] In re: *Idaho Conservation League et al*, Petitioners and EPA filed a joint motion for an order on consent ("joint motion") specifying an agreed upon schedule for the CERCLA § 108(b) rulemaking for the hardrock mining industry.

CERCLA §108(b) FR program[26] would create. EPA's highly flawed FA Market Study performed in conjunction with the rulemaking for the Proposed Rule reveals there could be insufficient marketplace capacity to satisfy EPA's projected FR requirement under the Proposed Rule. This finding underscores and quantifies the magnitude of the regulatory burden associated with the Proposed Rule, which would require the hardrock mining industry to obtain third-party FR instruments that would not be commercially available to many hardrock mining companies. EPA's Market Study confused "capacity" with "availability." Capacity does not equal availability. EPA failed to determine if FR instruments would be available regardless of capacity.

EPA's FA Market Study estimates there may be as much as $600 million of market capacity for environmental insurance and $5 billion for surety coverage, resulting in an aggregate market capacity of $5.6 billion potentially available to respond to a future CERCLA §108(b) FR requirement. (FA Market Study at 2). EPA's $7.1 billion estimate of the price tag for the CERCLA §108(b) FA program significantly exceeds the estimated FA market capacity. As indicated in comments by NMA and others such, we believe EPA's cost estimate of $7.1 billion is inaccurate and the costs are likely to be far higher.[27] With only $5.6 billion in market capacity, it is easy to see that many operations will not be able to find coverage in the market.

EPA's FA Market Study reveals a great deal of uncertainty regarding the market's ability to satisfy the demand for CERCLA §108(b) FA:

> *At this time it is not possible to predict the exact market for these instruments in response to EPA's CERCLA 108(b) regulations.* (FA Market Study at 5).
>
> *[T]here may be softening of the underwriting of traditionally volatile lines of business, including environmental liability and mining…Such uncertainty makes it exceedingly difficult to make inferences or predictions from the data as to future market trends and capacity*. (FA Market Study at 8).
>
> *[I]t is important to keep in mind that insurers and sureties will continue to be wary of business lines that are recognized as volatile (as the hardrock mining industry could be characterized)*. (FA Market Study at 16).

Moreover, EPA's FA Market Study acknowledges that the universe of willing FA providers has recently shrunk noting that in January 2016, AIG, one of the largest underwriters of environmental liability insurance to cover large-scale and long-term environmental risks, announced it would no longer offer environmental impairment liability coverage. In evaluating AIG's announcement, EPA's research found that "the marketplace is continuing to evaluate the impact of this decision." (FA Market Study at 15).

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[26] CERCLA 108(b) Hardrock Mining and Mineral Processing Evaluation of Markets for Financial Responsibility Instruments and the Relationship of CERCLA 108(b) to Financial Responsibility Programs of Other Federal Agencies, August 25, 2016. ("FA Market Study")

[27] In its May 5, 2017 comment letter to EPA, Freeport McMoran indicated that it alone will have to add as much FR ($4-7 billion) as EPA projected for the entire mining industry ($4-7 billion).

Similarly, Wells Fargo informed EPA of the limited market capacity for covering mining risks, cautioning that "Energy risks, power and utility risks, and mining risks: these industries have significantly less capacity available to them, with carriers generally not willing to write more than a one- or two-year term." (FA Market Study at 18).

The Proposed Rule acknowledges that a FR program pursuant to CERCLA §108(b) would create a demand for FR instruments that the market may not be able to satisfy:

> *Given the number of unknown factors, the ultimate availability of CERCLA § 108(b) financial responsibility instruments cannot be predicted with certainty until the final rule has been promulgated. At that time, the available instruments will be determined, and the market will have an opportunity to respond.*(FR at 3399)

EPA's "Build it and They Will Come" theory about the future availability of FR instruments to satisfy the demand created by a CERCLA §108(b) rule is dangerously speculative, could result in serious regulatory compliance problems for the industry, and creates an extraordinary regulatory burden in violation of numerous EOs, including EO 13777, not to mention jeopardizing our national security by removing critical minerals for national security from domestic production.

The materials EPA provided to the SERs during the SBAR Panel process[28] showed projected FA costs for hypothetical companies with credit ratings ranging from CCC+ to B+. This analysis is inapplicable for some companies in the hardrock mining industry (especially small, startup companies like many of the SERs) that do not have a revenue stream and therefore do not have a credit rating.

For those companies that could qualify for third-party, commercial FR instruments, there is widespread concern over the cost of securing and maintaining these instruments. So, in addition to the problems associated with the projected limited market capacity to respond to a future demand for CERCLA §108(b) FR, the significant cash collateral required to obtain a CERCLA 108(b) FR instrument would be very problematic. This cash collateral requirement, which could be as much as 100% plus fees, would reduce the capital that companies have available to conduct reclamation activities, advance environmental improvement initiatives, and pursue business development opportunities. Ultimately the drain on corporate capital that would result from the CERCLA §108(b) FR program would reduce the domestic production of minerals, cost hardrock mining jobs, and economically devastate mining dependent rural communities.

As noted in EPA's Market Study, aspects of the CERCLA §108(b) FR program – especially the payout to multiple claimants (i.e., third parties seeking monies from the CERCLA §108(b) FR instruments for natural resource damages and other claims) – "presents a different regulatory framework [that was] not universally familiar to the providers." (FR Market Study at 5). The

[28] See August 23, 2016 EPA PowerPoint Presentation entitled "CERCLA 108(b) Financial Responsibility, Small Business Advocacy Review Panel Outreach for August 2016 Meeting"

issue of third-party claimants who have standing under CERCLA to seek money from the CERCLA §108(b) program could be a serious market constraint if FA providers are not willing to provide FR instruments under these circumstances. Secondly, the opportunity for third-party claims against a CERCLA §108(b) FR instrument is likely to increase the potential for frivolous damage claims and lawsuits.

Under EPA's own evaluation, the Proposed Rule carries an enormous annual industry price tag of $171 million. Based on EPA's Market Study, however, there is significant potential this is an underestimate of the actual costs to the mining industry. The central theme of EPA's Market Study is the suggestion that capacity will exist to provide the necessary financial instruments. However, as indicated above, there is great uncertainty in these predictions especially since the study provides no definitive indications of commitments to provide such instruments and the expected costs. If in fact, some or all hardrock mining companies cannot obtain such instruments, they would have to self-fund some or all of the required FA. Because they lack cash flow, most junior mining companies and mine developers will be unable to meet the financial test to self-insure or self-fund.

If facilities do have to self-fund the FA, the impacts on the US mining industry could be devastating. In highly competitive world markets, U.S. producers cannot afford to hold tens or hundreds of millions of dollars in escrow for potential future releases that EPA has not demonstrated could occur. Given the uncertainties expressed in the market study, it is highly negligent of EPA not to at least analyze implementation scenarios, including determining the socioeconomic impacts, where FA instruments are not available.

Because the Proposed Rule creates a FR requirement for which there is a reasonable expectation of inadequate commercial capacity, it places an unacceptable regulatory burden on the hardrock mining industry that violates the directives in EOs 12866, 13563, and 13771. This regulatory burden also is inconsistent with President Trump's EO 13777, and is therefore an excellent example of a proposed regulation that should be withdrawn pursuant to EO 13777.

VIII. The SBREFA SBAR Process Was Flawed

As indicated above, AEMA participated as a SER in the SBREFA required SBAR Panel process. AEMA submits that EPA failed to comply with the letter and spirit of SBREFA and violated its own Regulatory Flexibility Act (RFA) Guidance,

> *You should provide the SERs with enough information about the rule for them to be able to judge the likely impacts of the rulemaking on small entities. Outreach materials could include any draft of the rule or preamble text, if such materials are available*. Section 5.7.5.

Despite repeated requests for the model and formulae, EPA failed to provide this basic information necessary to determine the impact of a CERCLA §108(b) rule on small entities.

EPA failed to provide the SERs the formula for calculating FR requirements which prevented the SERs from determining the impact of the Proposed Rule on their operations. Throughout the SBAR process, the SERs expressed concern with the transparency of the process, the lack of relevant information about the model and formula and EPA's rush to get a Proposed Rule published by December 1, 2016 in order to comply with an arbitrary date in a Court Order. The result, in our view, is a flawed SBREFA process. Had EPA shared the formula and model with the SERs, we could have engaged experts to review the model and formula and helped EPA develop a rule with minimal adverse financial impacts on SERs and the hardrock mining industry while complying with CERCLA §108(b)'s mandate.

Throughout the SBAR process, AEMA and other SERs have repeatedly requested information concerning the model and formulae, including:

- the selection criteria used to identify the 63 mines used to inform the model/formula;
- the complete list of engineering controls and best management practices the agency is currently considering for reductions in the total financial responsibility obligation, including those controls and practices EPA intends to include that are currently required under state and federal regulatory programs;
- the criteria for identifying engineering controls and best management practices that will be assigned reduction values in the model/formula;
- the corresponding reduction percentages/values for each engineering control and best management practice and the criteria, formula, and assumptions used to determine these numbers; and
- the formula, calculations, and assumptions, including spreadsheets, used to determine the annualized instrument costs to obtain the hypothetical financial responsibility amounts in the SBREFA slides, including the costs for insurance policies, trust funds, and letters of credit, as well as information on costs for surety bonds (not provided in the slides, at the June 9 or August 31, 2016 meetings).

Without this information, it was impossible for the SERs to determine the financial impact of a CERCLA §108(b) rule on their businesses. By email dated September 6, 2016, AEMA requested additional information necessary to properly comment on EPA's proposal and fulfill our responsibility as a SER. By email dated September 14, EPA stated it was able to clarify some points, but would provide no new or additional information. EPA stated that it believes the information provided "*provides sufficient basis for meaningful comments from the SERs*." AEMA disagreed. Without knowing how the financial responsibility for each of the 13 response categories was calculated and without knowing the criteria used to qualify for a reduction, our members could not determine the impact of a CERCLA §108(b) rule on their operations. It was impossible to evaluate the validity of the formula EPA intended to use. EPA failed to meet SBREFA's statutory requirements.

Advocacy's comment letter also discusses EPA's failure to comply with the RFA's requirement to consider significant small business alternatives (Advocacy letter, Section 5 at p. 14). The SBREFA amendments to the RFA provide that an agency's compliance with the RFA is judicially reviewable and that a court may remand a rule to the agency and defer enforcement.

See, Northwest Mining Association v Babbitt, 5 F.Supp.2d 9 (DDC 1998). EPA can avoid a remand of the Proposed Rule for failing to comply with the RFA by issuing a **No Rule Final Rule.**

IX. Conclusions

Based on information EPA did provide the SERs, information provided by FLMA and State regulators, and this rulemaking record, it is clear EPA has not done the diligence required to support the need for the regulations in the Proposed Rule. EPA acknowledges that the Proposed Rule is not appropriate for legacy sites, yet uses irrelevant, outdated legacy and pre-regulation site information to inform the formula and in an attempt to justify the Proposed Rule. At the same time, EPA has failed to provide any evidence to suggest existing FLMA and State FR programs are insufficient. This shifting of the burden of proving a negative is entirely inappropriate and illegal.

Furthermore, with EPA concluding that a CERCLA §108(b) rule will be applied only to mines operating on or after the effective date, or idle but authorized to operate on or after the effective date, it is unreasonable, arbitrary and capricious for EPA to assume that all currently operating mines and mines which will be authorized in the future pose a risk of releasing hazardous substances to the environment and that all 13 response costs will be incurred. The rulemaking record, including these comments and comments filed by industry, affected States, FLMAs, and Advocacy clearly demonstrates: 1) that modern mine regulatory and FA programs, together with modern mining practices and engineering controls are working; and 2) that a CERCLA §108(b) rule is unnecessary.

Therefore, EPA should conclude, based on the rulemaking record that the CERCLA §108(b)'s statutory mandate has been met and additional financial responsibility requirements are not necessary to protect the federal Superfund program and the American Taxpayer. The DC Circuit Court of Appeals empowered EPA to reach this conclusion in its Mandamus Order,

> *But the proposed joint order "does not require EPA to promulgate a new, stricter rule." Id. at 1324. At most, it "merely requires that EPA conduct a rulemaking and then decide whether to promulgate a new rule — the content of which is not in any way dictated by the [proposed order on consent] —* using a specific timeline." *Id.* The timeline in the joint motion requires that EPA commence a rulemaking with respect to hardrock mining by December 1, 2016, and provide "notice of its final action" by December 1, 2017. Joint Mot. 3. Although more is required with respect to hardrock mining than the other identified industries, where EPA retains discretion not to conduct a rulemaking at all, *EPA retains "discretion to promulgate a rule or decline to do so" even for the hardrock mining industry.*[29] (Emphasis added)

[29] *In re Idaho Conservation League, et al,* No. 14-1149 (DC Cir. January 29, 2016) at 17.

As discussed above, the costly and highly flawed Proposed Rule creates a regulatory burden on the hardrock mining industry that is duplicative, unnecessary, and inconsistent with numerous regulatory directives in President Clinton's EO 12866 and President Obama's EO 13563. Pursuant to President Trump's EO 13771, EPA would have to repeal two regulations that impose comparable costs (at least $171 million/year) on the private sector if the Agency elects to proceed with the Proposed Rule. EPA could avoid this impact altogether by withdrawing the regulations in the Proposed Rule and issuing a "No Rule" Final Rule.

The Proposed Rule would place an enormous and unjustifiable financial burden on the entire U.S. hardrock mining industry. The onerous and duplicative FR requirements in the Proposed Rule would substantially reduce domestic production of critically important minerals, put thousands of U.S. mining jobs at risk, and dramatically increase the Nation's reliance on foreign minerals. Clearly, these outcomes are not in the Nation's best interests and do not comply with the EOs discussed above.

For these reasons, AEMA strongly urges EPA to withdraw the regulations in the Proposed Rule and issue a Final Rule establishing that no additional FR is required for the hardrock mining industry. Withdrawing the Proposed Rule and replacing it with a Final Rule documenting that no additional FA is needed for modern hardrock mining operations would alleviate a substantial and unwarranted regulatory burden and help to lift the enormous cloud of uncertainty that is currently costing mining jobs and chilling investment in the U.S. hardrock mining industry. AEMA believes the record in the rulemaking for the Proposed Rule provides overwhelming support for this Administration to withdraw the regulations in the Proposed Rule and issue a Final Rule that no additional FR pursuant to CERCLA §108(b) is required for hardrock mining.

AEMA incorporates by reference as though fully set forth herein the comments of the NMA, Rio Tinto/Kennecott, Newmont Mining Corp., Barrick Gold N.A., Hecla Mining Company, Coeur Mining, Kinross Gold USA, and NOVAGOLD Resources.

Respectfully Submitted,

Laura Skaer

Laura Skaer
Executive Director

HARDROCK MINE RECLAMATION AND REGULATION

HOW CHANGING VALUES and CHANGING LAW CAUSED HARDROCK MINES to DESIGN, BUILD, and OPERATE for LONG-TERM CLOSURE and RECLAMATION: A FEDERAL and STATE REGULATORY SUCCESS STORY

prepared for the

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1.0 Executive Summary

The federal and state regulation of hardrock mining and milling facilities (collectively, "hardrock mines")[1] is a success story of environmental protection that is well-illustrated by the fact that of the **none** of the Western hardrock mines that were designed, built and/or approved in the last 26 years are on the United States Environmental Protection Agency ("EPA") National Priorities List of environmental cleanup sites. To characterize this another way, there has never been an environmental problem at a hardrock mine approved by a federal or state agency in the West after 1990 that required EPA to make any such hardrock mine a Superfund "top priority among known response targets." Finally, and most succinctly, no hardrock mine permitted/approved in the West after 1990 has ever been placed on EPA's Superfund National Priorities List. This is in stark contrast to Western hardrock mines designed and built prior to 1970 when there were no regulatory approvals for such facilities and no cultural guidelines.

The reasons for this are straightforward and summarized below.

Current hardrock federal and state mine regulation is protecting the environment. This is not just the opinion of the relevant agencies or the hardrock mining industry. It is also the opinion of the federal government's National Academy of Sciences/National Research Council and the bi-partisan Western Governors' Association.

In 1999, the federal government's independent National Academy of Sciences/National Research Council produced a comprehensive report entitled "Hardrock Mining on Federal Lands" regarding then-current hardrock mine regulation on lands managed by the federal government and states agencies and determined:

> The overall structure of the federal and state laws and regulations that provide mining-related environmental protection is complicated but generally effective.
>
> …
>
> Simple "one-size-fits-all" solutions are impractical because mining confronts too great an assortment of site-specific technical, environmental, and social conditions. Each proposed mining operation should be examined on its own merits. … **Recommendation: BLM and the Forest Service should continue to base their permitting decisions on the site-specific evaluation process provided by NEPA [National Environmental Policy Act].** …

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[1] For the purposes of this study, "hardrock mine" includes any facilities deemed to be a "mining" or "beneficiation" facility by the EPA. EPA has defined "mining and beneficiation" to include, generally, all metal mines, but EPA's use of the term "hardrock mine" also includes many non-metallic industrial mineral mines, such as phosphate rock, trona, fluorospar, and mica, as well as the mills required to concentrate the target minerals of these ores. See generally 40 C.F.R. 261.4(b)(7)(July 15, 2016). In common usage, EPA's "mining and beneficiation" is more typically referred to as "hardrock mining and milling" or just for the purposes of this Report sometimes "hardrock mine."

"Hardrock Mining on Federal Lands," National Academy of Sciences/National Research Council, Executive Summary, p. 5. Importantly, the bi-partisan Western Governors Association has determined that the Western States, which regulate hardrock mining on state and private lands within their borders, "... impose permit conditions and stringent design and operating standards, to ensure that hardrock mining operations are conducted in a manner that is protective of human health and the environment." WGA, Policy Resolution 10-16, Background (A)(8) ("National Minerals Policy"). Moreover, the states and federal agencies have continued to strengthen their reclamation and financial assurances requirements on an ongoing basis.

The correctness of the 1999 National Academy of Sciences determinations were revalidated and confirmed by Senator Murkowski's 2011 Investigation, when the United States Forest Service ("Forest Service") and the United States Bureau of Land Management ("BLM") reported to the Senator that out of 3,344 mining plans of operations approved by these two agencies since 1990, **none of these 3,344 federal mine plan approvals created an environmental problem that caused EPA to place any of these hardrock mines on EPA's highest priority environmental clean-up sites.** Therefore, Senator Murkowski's study objectively demonstrates the continued correctness of the National Academy/National Resources Council's 1999 determinations.

The development of the effective hardrock mine regulation and reclamation of the Forest Service, the BLM and Western States did not occur overnight. There was a "learning curve" that took a couple of decades. But the single most important factor creating effective hardrock mine regulation has been an American cultural shift since about 1970 with the advent of the modern environmental movement. Prior to 1970, municipal waste, industrial waste and hardrock mines were not regulated to protect the environment. Protecting the environment was not a major societal priority. The US hardrock has incorporated these environmental values into the cultural fabric of the industry.

The absence of environmental protections prior to 1970 was, in significant part, a legacy of the then-dominant American cultural focus from the Great Depression on jobs and the economy, followed immediately by World War II, the Cold War and the Korean War. All of these nation-threatening events caused the federal government to force dramatic and environmentally-harmful national efforts to quickly and heroically increase the chain of industrial and manufacturing production to historic heights. Hardrock mining was (and remains) the first and primary link in much of the manufacturing chain. Much of the CERCLA hardrock mine negative environmental legacy arose during this period or long before. Even in the late 1950s, President Eisenhower's forward-looking "Blueprint for America" did not even mention the environment.

The modern environmental movement, symbolized by the first Earth Day and by the enactment of the National Environmental Policy Act in 1970, evidenced a shift of our society from one that had been almost wholly-focused on industrial and manufacturing production values to a society where environmental values had a role, too. This shift in values was implemented by changes in law and regulation over the next twenty years as the United States adjusted to this more balanced approach to hardrock mining. As

discussed below, these laws, regulations and the collective experience of federal and states agencies, as well as the hardrock mine industry (learning from regulatory omissions along the way) have created a regulatory climate and an operating culture in which current hardrock mine regulation is an effective protector of the environment.

Hardrock mines designed and built prior to 1970 were developed to maximize production and minimize cost with little or no regard for environmental values. Importantly, however, after 1990, all new hardrock mines have been designed, built and operated to integrate long-term environmental closure and reclamation as a primary design standard. This is required by current law, but it is also required by the U.S. culture, generally, and by the U.S. hardrock mining industry, specifically.

Therefore, the EPA cannot rationally use information about environmental closure and reclamation costs from hardrock mines designed and approved prior to 1970 to assess the degree and duration of environmental risk associated with hardrock mines in 2017. Doing so would be as absurd as assuming that the design flaws of the 1964 Chevrolet Corvair, made infamous by Ralph Nader's 1966 book "Unsafe at Any Speed," should be used to assess whether any new National Highway Traffic Safety rules are needed in 2017. In both the hardrock mine and the NHTSA examples, the result of such assessments would be equally hopeless and comically out of date.

The Forest Service, the BLM, and the Western States reclamation agencies, in concert with the hardrock mining industry environmental management, have prevented any hardrock mine, designed and approved after 1990, from being deemed by EPA to be a "top priority" cleanup site.

This achievement is a genuine "success story."

2.0 Hardrock Mining Regulation Effectiveness – EPA has never determined that any hardrock mine approved by a federal or a Western State agency after 1990 to be among the "top priority among known response targets"

2.1 EPA's National Priorities List for CERCLA Cleanup

The federal "Comprehensive Environmental Response Compensation and Liability Act of 1980, as amended (commonly referred to as "CERCLA" or "Superfund"), requires EPA to publish the National Priorities List annually to identify the "national priorities among known releases or threatened releases [of hazardous substances] throughout the United States …."[2] The National Priorities List identifies "[t]o the extent practicable, … [EPA's] 'top priority among known response targets'…."[3] The National Priorities List ("NPL") includes over 1100 sites, which includes only about 50 hardrock mining sites, which, in turn are almost all pre-1970 facilities.[4]

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[2] 42 U.S.C. Section 9605(a)(8)(B).
[3] Id.
[4] http://www.epa.gov/superfund/sites/npl (March 30, 2012). Unfortunately, EPA had prepared and electronically-published a Table designated "Summary – Mining Sites on the National Priorities List"

EPA has specifically determined that hardrock mining wastes pose significantly lower environmental risk than "mineral processing" wastes, and so EPA has determined that "high volume" "low hazard" wastes should not be regulated as if they were "hazardous wastes."[5] Therefore, information about environmental problems with inorganic chemical plants and mineral processing facilities that generate actual "hazardous waste" does not provide any useful information to assess the environmental issues associated with hardrock mines. Accordingly, even more importantly, environmental regulatory issues associated with mineral processing facilities and inorganic chemical plants provide no information about the current regulation of hardrock mining. Mineral processing and inorganic chemical plants are subject to substantially different regulatory programs, standards and procedures than hardrock mines. In short, to have an intelligent discussion about the effectiveness of hardrock mine regulation one must evaluate hardrock mining and milling facilities that were actually subject to regulation since 1990. EPA's now-defunct NPL Mining Sites List failed to do this, since almost one-half of the EPA's so-called "Mining Sites" were in fact mineral processing or inorganic chemical plants.

2.2 A specific hardrock mine clean-up case study cannot be used to evaluate the effectiveness of *current* hardrock mine regulation if that specific hardrock mine had not been subjected to regulation prior to its design and construction

One cannot evaluate the effectiveness of hardrock mine regulation if one does not first consider whether or not a case study hardrock mine had been subject to regulation, and then second, if applicable, one must consider the nature of the specific regulation to which a hardrock mine had been subject to regulation *prior to its design and construction*. Obviously, it is utterly pointless, absurd, and deliberately misleading, to pretend to "evaluate" the effectiveness of hardrock mine regulation with reference to any hardrock mine that has never been subject to regulation! Nevertheless, nongovernmental organizations (NGO's) that seek their funding by opposing hardrock mines inevitably use

("EPA's Mining Site List," May 2013, www.epa.gov/aml), but EPA's Mining Site List was highly misleading because it did not include only hardrock mines, nor even just "hardrock mining and milling sites." Unfortunately, EPA's "Mining Sites List" included large numbers of downstream inorganic chemical plants and "mineral processing" sites that are not hardrock mines. This critical substantive distinction seems to have given rise to multiple legal actions filed by non-governmental organizations ("NGO") against the hardrock mining industry and against EPA speciously seeking regulation of hardrock pursuant CERCLA 108(b). Fortunately, after the NWMA/AEMA provided its public comments regarding EPA's fatally-flawed "Summary – Mining Sites on the National Priorities List" and other closely-related issues in EPA's "Bristol Bay" public docket (see discussion in Section 2.4 below), EPA terminated its dissemination of this particular grossly misleading information by removing it from EPA's website. Nonetheless, the NGO legal challenges against the mining industry that were apparently supported, in part, by EPA's years of misinformation regarding the hardrock mining industry, continue to this day.

[5] See 50 Fed. Reg. 40,292 (Oct. 2, 1985); EPA, "Report to Congress, Wastes from the Extraction and Beneficiation of Metallic Ores, Phosphate Rock, Asbestos, Overburden from Uranium Mining, and Oil Shale," (Dec. 31, 1985); 55 Fed. Reg. 32,135 (Aug. 7, 1990); and EPA, "Report to Congress on Special Wastes from Mineral Processing" (July 1990).

historical and factually irrelevant examples to suggest there are current problems with hardrock mines in both regulatory and litigation settings.[6]

Hardrock mines designed and built prior to 1970 were developed to maximize production and minimize cost, but after 1990, all new hardrock mines have been designed, built and operated to integrate long-term environmental closure and reclamation as a primary design standard, as required by current law and culture. Therefore, the success of hardrock mining regulation must be evaluated by using reasonably current applicable rules.

No one would suggest that General Motors (GM) should be prohibited from producing cars in 2017 or subject to new regulation because, in 1965, GM produced the Corvair (deemed "unsafe at any speed" by Ralph Nader[7]) which does not meet 2017 standards. Yet, critics of the hardrock mining industry repeatedly and constantly describe environmental problems at hardrock mines that were designed and operated prior to 1970 as illustrative of current hardrock mine.[8] This is absurd.

Hardrock mines designed and operated prior to 1970 were in place long before hardrock mines were subject to any regulation whatsoever. Thus, it is critical to determine, even if only generally, the extent to which any hardrock mine used as an example or case study to evaluate the effectiveness of hardrock mine regulatory programs has actually been subject to relevant regulatory programs.

2.3 Hardrock mines on the National Priorities List must be rationally classified into three (3) major eras based upon applicable regulation or the lack thereof: (1) Pre-Regulatory Era (prior to 1970); (2) Transition Regulatory Era (1970 through 1990); and, (3) the Regulated Hardrock Mine Era (post-1990).

Hardrock mine regulation must be classified into 3 major eras based upon the extent of applicable regulation or the lack thereof: (1) Pre-Regulatory Era (prior to 1970); (2) Transition Regulatory Era (1970 through 1990); and, (3) Regulated Hardrock Mine Era (Post-1990). Below, Section 4.0 ("Changing Societal Values – The Great Depression, World War II, the Cold War, and the Advent of the Modern Environmental Movement") provides some of the policy history supporting use of these three temporal classifications. Further below, Section 5.0 ("Development of Legally-Applicable Hardrock Mine

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[6] Maest, A.S., Kuipers, J.R., Travers, C.L. and Atkins, D.A., 2005, "Predicting Water Quality at Hardrock Mines: Methods and Models, Uncertainties, and State-of-the Art." But importantly also see, Schlumberger Water Services, 2013, "Technical Review of the Kuipers Maest, 2006, 'Comparison of predicted and actual water quality at hardrock mines: The reliability of predictions in Environmental Impact Statements,'" p. 1, that determined *inter alia* that "The conclusions contained in the [Maest Kuipers, 2006] report are not relevant to any current mines that are being permitted, or to any future mines ...[because] [m]odern-day characterization and analysis techniques have changed so radically from virtually all of the studies cited by the report that it is meaningless to draw any comparison to modern-day conditions." Emphasis added.

[7] Nader, Ralph, Unsafe at any speed: The Designed in Dangers of the American Automobile, Grossman Publishers, 1965.

[8] See footnote 6, supra.

Regulation") provides a summary of the primary legal support for using these three (3) temporal classifications.

Facilities designed and constructed in the Pre-Regulatory Era (prior to 1970) provide no useful information about the effectiveness of current hardrock mine regulation "predictions" since Pre-Regulatory Era Hardrock Mines were designed, constructed and operated to maximize production and minimize cost. Pre-Regulatory Era Hardrock mines did not even consider long-term environmental closure and reclamation. In stark contrast, long-term environmental closure and reclamation are required by current federal and state law, while Pre-1970 hardrock mines were never subject to any regulation whatsoever. Even worse, Pre-Regulatory Era facilities were conceived, designed and operated even before environmental values were imbedded in the American culture. Thus, when subsequently enacted laws and regulations were applied to these facilities after-the-fact, such regulatory efforts could not influence the facility design and construction. Thus, such regulation could never hope to prevent *all* releases to the environment from facilities. For example, tailings facilities from the Pre-Regulatory Era were often <u>designed</u> to release to the ground water for reasons of structural safety, while even simple release-reporting to ground water was only required starting in the 1980s, and even then, only under certain limited circumstances. In short, pre-1970 Pre-Regulatory Era facilities were not conceived, designed or operated with significant concern for the environment.

Importantly, even hardrock mines designed and constructed during the Transition Regulatory Era were often not subject to direct regulatory approvals. But at least there was an increasing cultural awareness of the regulated community and the government that environmental values needed to be considered, even if imperfectly. However, *those Transition Regulatory Era Mines that were actually subject to regulation* were never subject to full control of surface and ground water regulation and geochemical predictive modeling that characterizes current hardrock mine permitting.

For example, in 1985, it was EPA's assessment was that "EPA data on management methods at mining facilities indicate that only a small percentage of mines currently [i.e., 1985] monitor their ground water, use run-on/run-off controls or liner, or employ leachate collection, detection, and removal systems." 50 Fed. Reg. 40,292 (Oct. 2, 1985); EPA, "Report to Congress, Wastes from the Extraction and Beneficiation of Metallic Ores, Phosphate Rock, Asbestos, Overburden from Uranium Mining, and Oil Shale," (Dec. 31, 1985) ("RTC I," p. ES-10.) Therefore, as a practical matter, according to EPA, any discussion of the effectiveness of "environmental predictions" at facilities designed and approved prior to 1985 is utterly meaningless. To restate this point, hardrock mining facilities designed and approved prior to 1985 do not provide any useful information about current regulation of hardrock mines because pre-1985 hardrock mines were not designed, built and operated to integrate long-term environmental closure and reclamation. This is in sharp contrast to current law and regulation.

Therefore, per EPA, there was almost no comprehensive regulation of ground water discharges prior to 1985. Of course, such programs were not created overnight. Even in

1990, programs specifically designed to preclude groundwater releases from mining facilities were in their infancy and geochemical "predictive" modeling was largely conceptual at that time. Modern geochemical predictive modeling really did not begin practical application as a regulatory tool in the mid-1990s. For example, Earthworks, a group that opposes the hardrock mining industry, contracted for a report "Predicting Water Quality at Hardrock Mines: Methods and Models, Uncertainties, and State-of-the Art" in which of 202 references cited to, only 28 dated from before 1990, and most of the directly pertinent geochemical references have been published since 2000.[9] Nevertheless, if one evaluates and then assigns each hardrock mine that EPA has deemed to be among its "top priority among known response targets" (i.e., the NPL) to the major regulatory era when it was designed, constructed and approved, then a very clear and incontestable picture develops, as discussed immediately below.

2.4 Northwest Mining Association June 30, 2013 Comments on EPA's Bristol Bay Watershed Assessment determined that current hardrock mining regulations were protective of the environment, citing to specific federal and state government studies that explicitly support this conclusion.

The American Exploration & Mining Association (AEMA) (formerly Northwest Mining Association or "NWMA") provided comments to EPA's Bristol Bay Watershed Assessment concerning the Alaskan Pebble Project on June 30, 2013 regarding the effectiveness of existing hardrock mine regulation. Baird, 2013, "Hardrock Mining Reclamation and Reclamation – Developing Sustainable Environmental Protection through Changing Values, Changing Laws and Experience: A Federal State Success Story" (the "NWMA 2013 Study"). The NWMA 2013 Study provides detailed support to arrive at its conclusions that:

> Current Hardrock Mining regulation is protecting the environment. However, this is not just the opinion of the relevant agencies or the Hardrock Mining industry; it is the opinion of the National Academy of Sciences and the bi-partisan Western Governors' Association.

Unfortunately, EPA apparently wholly-ignored the NWMA 2013 Study with regard to the "Bristol Bay Watershed Assessment," except that the NWMA 2013 Study may have caused EPA's to terminate use of its so-called "NPL Mining Site List." Nevertheless, to date, EPA has never referenced the NWMA/AEMA's 2013 Study.

AEMA must assume EPA's failure to acknowledge the relevant indisputable facts described in NWMA's 2013 Report has something to do with the bias that occurred within EPA regarding the "Bristol Bay Watershed Assessment." More specifically, the respected Cato Institute "think tank" has stated:

> Because there was never a mining permit application [submitted for the Pebble Project], EPA charged a senior biologist (not a mining engineer)

[9] See footnote 6, supra.

named Phillip North to design a worst case scenario open-pit 'hypothetical mine' that could never be approved. … North then proceeded to 'model' the maximum deleterious impact of the nonexistent, unplanned, and imaginary mine …

EPA and North simply ignored … [a $150,000,000 in scientific study of the] biology, ecology, and dynamics of the Bristol Bay watershed. EPA and North simply ignored this remarkable repository of information before admitting, during the entire time that the Bristol Bay Watershed Assessment was written (2011-2014), that it was never really intended to provide a scientific foundation for regulatory decision-making, after all.

…

While he was creating his hypothetical mine, Mr. North also coached anti-Pebble activists on how to petition his own Agency to stop the real permit application. It appears he even wrote petitions. …

Mamula, Ned and Michaels, Patrick J., 2016, "A Green Mess: Is EPA in Hot Water over Alaska's Bristol Bay?" http://www.cato.org/publications/commentary/green-mess-epa-hot-water. Importantly, when the House Oversight Committee sought to bring Mr. North before a Committee Hearing in 2013:

… he delayed, bobbed and weave, and suddenly pulled his children out of school and fled the country.

Id. Therefore, the AEMA/NWMA must assume that the important information that it has previously presented to EPA regarding the adequacy of existing hardrock mine reclamation has been lost to EPA's unethical Bristol Bay Watershed Assessment sideshow.

Accordingly, the AEMA has developed this document in 2017 to further support its and refine the NWMA's original demonstration that currently, federal and state hardrock mine reclamation programs and financial assurance mechanism are protective of the environment. Therefore, the AEMA commissioned the independent expertise of Enviroscientists, Inc. to review and assess NWMA's 2013 Report to be sure that its information is fully considered by future EPA actions.

2.5 The 2015 Enviroscientists Report confirms the AEMA/NWMA Comments on the Bristol Bay Watershed Assessment in June 2013 that determined that no Western hardrock mine has been placed on the CERCLA NPL since 1990

Dr. Richard DeLong of Enviroscientists, Reno, Nevada, has completed an assessment of U.S. Environmental Protection Agency's National Priorities List ("NPL") for Mining and Milling Sites. Please see attached "Memorandum" from Richard DeLong to Joe Baird,

Baird Hanson LLP, dated, May 15, 2015, "Assessment of Mining and Milling Sites on the National Priorities List" ("Enviroscientists Memo"). Dr. DeLong's analysis states:

> There are over 1,100 sites on the NPL. Of those, there are 100 that the EPA has classified as MMS [i.e., "Mining and Milling Sites"]. However, only 55 of those sites are actual mining operations where mineral resources were extracted from the earth. The other 45 are mineral processing facilities where a mineral product is delivered to the operation for further processing. The 55 "hardrock" MMS on the NPL fall into the following temporal classifications: 49 are prior to 1970; five are from 1970 through 1990; and one is post-1990 and it is the Barite Hill property in South Carolina.

Therefore, per the Enviroscientists' Memorandum, the 55 Mining and Milling sites on the NPL fall into the following temporal classifications:

Pre-Regulatory Era (prior to 1970)	49
Transition Regulatory Era (1970 through 1990)	5
Regulated Hardrock Mine Era (post-1990)	1[10]

By eliminating the "red herring" mineral processing and inorganic chemical plants from the EPA's so-called "Mining" Sites List of 100 sites, the EPA List can be corrected to include about 55 sites that are hardrock mining sites, but **only if** one includes hardrock mining sites from ***all*** eras, including many historic facilities dating back to the 1800s, which obviously provided no information about 20th century mine design, construction, operation and reclamation/closure practices, let alone 21st century practices.

Obviously, and most importantly from the perspective of evaluating the success of current hardrock mine regulation, *none* of the hardrock mines on the National Priorities List were approved after 1990 in the West.[11] Moreover, this is validated and updated regarding federal lands by the Forest Service and the BLM, as discussed immediately below.

[10] Barite Hill, McCormick County, South Carolina, EPA Facility ID SCN000407714. According to EPA, from 1991 to 1995, gold and silver mining was conducted at the site.

[11] It is important to note that eliminating mineral processing and inorganic chemical plant sites almost certainly does not affect the number of regulated facilities from EPA's so-called Mining Site List that would be deemed to be located on the NPL since 1990. In fact, there have been very few new mineral processing facilities constructed since 1990, other than updating of existing facilities (e.g., Rio Tinto's Utah Copper Division) or use of small "mineral processing" facilities such as the dore furnaces commonly located at gold mines. Very few, if any, new large regional mineral processing facilities have been constructed since 1990. Nevertheless, one cannot have an intelligent discussion about the efficacy of or even enumerate the issues related to regulating hardrock mines and mills if the data includes information about mineral processing and inorganic chemical plants.

3.0 Current hardrock mine regulation is protective of the environment, as determined by: (1) the United States National Academy of Sciences; (2) the Western Governors Association; and, (3) Senator Murkowski's 2011 Investigation.

3.1 The National Academy of Sciences/National Research Council has determined that existing hardrock mine regulation on federal land is "complicated but generally effective" in protecting the environment.

In 1999, the federal government's independent National Academy of Sciences/National Research Council ("NAS/NRC"), including several-related organizations,[12] produced a comprehensive report entitled "Hardrock Mining on Federal Lands" regarding then-current hardrock mine regulation on lands managed by the Forest Service and the Bureau of Land Management and determined:

> The overall structure of the federal and state laws and regulations that provide mining-related environmental protection is complicated but generally effective.
>
> ...

NAS/NRC, 1999, "Hardrock Mining on Federal Lands," p.5. Importantly, the NAS/NRC also identified a number of areas where implementation of existing laws could be improved, Id., pp. 6 – 9, and all of the NAS/NRC recommendations that increased the protection of the environment have since been adopted into current federal law.

Importantly, the Forest Service and the BLM continue to improve their programs. Since the 1999 NAS/NRS determination, for example, the Forest Service developed a new "Training Guide for Reclamation Bond Estimation and Administration – For Mineral Plans of Operation authorized and administered under 36 CFR 228A" in 2004, which considered the decades of experience that had developed concerning creating financial assurances and distilled much of this practical knowledge into the Forest Service manual. Additionally, in 2001, the BLM expanded its program to provide for financial assurances on all surface disturbing activities, including notice-level exploration projects affecting fewer than five acres. Thus, the hardrock mining regulation protecting federal land is continually improving and adjusting to take into account the lessons learned from experience, as is required pursuant to NEPA "adaptive management" strictures. These existing regulatory programs already substantially limit or eliminate the degree and duration of environmental risk associated with the current hardrock mining industry.

3.1.1 The NAS/NRC Report determined that "[s]imple 'one-size-fits-all' solutions are impractical because mining confronts too great an assortment of site-specific technical, environmental, and social conditions."

[12] "Committee on Hardrock Mining on Federal Lands," "Committee on Earth Resources," "Board on Earth Sciences and Resources," "Commission on Geosciences, Environment, and Resources."

Over the last 40 years, the Forest Service and the BLM have developed complicated, but nonetheless workable and environmentally protective programs under the auspices of their own authorities comprehensively coordinated by the National Environmental Policy Act ("NEPA") to properly evaluate and take into account site-specific conditions. The NAS/NRC properly characterizes the situation.

> Conclusion: Federal land management agencies' regulatory standards for mining should continue to focus on the clear statement of management goals rather than on defining inflexible, technically prescriptive standards. Simple 'one-size-fits-all' solutions are impractical because mining confronts too great an assortment of site-specific technical, environmental, and social conditions. Each proposed mining operation should be examined on its own merits. … Recommendation: BLM and the Forest Service should continue to base their permitting decisions on the **site-specific evaluation** [emphasis added] process provided by NEPA. The two land management agencies should continue to use comprehensive performance-based standards rather than rigid, technically prescriptive standards. …

"Hardrock Mining on Federal Lands," Executive Summary, p.5. The NAC/NRC emphasis on the criticality of site-specific evaluation is emphasized by NEPA, CERCLA's ARARs process and state permitting for determining rational standards that are protective of the environment and create realistic mechanism for reclamation guarantees.

3.1.2 The NAC/NRC Report correctly characterizes current hardrock mining industry as having minimal impact on public lands and NAC/NRC Report also correctly characterizes the importance of hardrock mining to the US economy and to US manufacturing

The NAC/NRC Report "… respond[ed] to a request by Congress that the National Research Council assess the adequacy of the regulatory framework for hardrock mining on federal lands." "Hardrock Mining on Federal Lands," Executive Summary, p. 1. Importantly, the Report states that "[t]he area of federal land available to hardrock mining in the Western states is enormous, but the surface area actually physically disturbed by active mining is small in comparison … [a]pproximately 0.06% of BLM lands are affected by active mining and mineral exploration operations." Id. And, "while society requires a healthy environment, it also requires sources of materials, many of which can be supplied only by mining." Id. Importantly:

> Regulations intended to control and manage the alteration of the landscape and the environment in an acceptable way are generally in place and are updated as new technologies are developed to improve mineral extraction, to reclaim mined lands, and to limit environmental impacts.

Thus, the NAC/NRC Hardrock Mining Report correctly notes that hardrock mining has a minor surface area "footprint" relative to total federal lands, and that society requires mining for survival.

3.2 Current hardrock mine regulation continues to be protective of the environment on federal lands as further evidenced by the United States Forest Service and the United States Bureau of Land Management Responses to Senator Murkowski's 2011 Investigation

By letter dated, March 8, 2011, Senator Murkowski's (R-AK) asked the Forest Service and the BLM how many mine plans of operations ("MPOs") the agencies had approved since 1990 and asked how many of those approved MPO facilities subsequently were listed by EPA on the NPL? The Forest Service responded to Senator Murkowski by stating that they had approved 2,685 MPOs since 1990 and stated that none of these required EPA to place them on the NPL. The BLM responded to Senator Murkowski by stating that they had approved 659 MPOs after 1990 and stated that none of these required EPA to place them on the NPL.

Thus, the 1999 NAS/NRC determination that current hardrock mine regulation was protective of federal lands was additionally confirmed and updated by Senator Murkowski's 2011 Investigation.

3.3 The Bi-Partisan Western Governors' Association confirms that the Western States "have a proven track record in regulating mine reclamation in the modern era, having developed appropriate statutory and regulatory controls" that are "protective of human health and the environment" as well as being protective of public treasuries

The Western Governors' Association has repeatedly determined that current Western States' hardrock mine regulation is protective of human health and the environment. The Western States have agencies and staffs that have been exclusively dedicated to prospective mine regulation and to prospectively requiring mine operating and mine reclamation plans. Additionally, good regulatory work and correct mine financial assurances have not only protected public health and the environment, but these regulatory programs have also protected state and federal public treasuries. Importantly, these WGA determinations have been Bi-Partisan. Even more importantly, these determinations regarding the quality of Western states mine regulation and reclamation have been on-going, made year-after-year, by an ever-changing group of Bi-Partisan Western Governors. Please note that WGA policy statements are either, renewed, updated or "sun-setted" every three (3) years, but it is also important to see the evolution of these policy statements.

In 2010, the Western Governors' Association ("WGA") stated:

> The Western States … extensively regulate hardrock mining operations on both public and private lands, and uniformly impose permit conditions and

> stringent design and operating standards, to ensure that hardrock mining operations are conducted in a manner that is protective of human health and the environment, and that, at closure, the mined lands are returned to a safe, stable condition for productive post-mining use.

WGA, Policy Resolution 2010-16, Background (A)(8) ("National Minerals Policy"). More recently, in 2011, the Western Governors Association "Policy Statement" further emphasized the above points stating simply:

> The member states have a proven track record in regulating mine reclamation in the modern era, having developed appropriate statutory and regulatory controls, and are dedicating resources and staff to ensure responsible industry oversight.

WGA, Policy Resolution 2011-4 ("Bonding for Mine Reclamation"). Previous WGA policy determinations provided foundation for the correctness of the above determinations, stating that:

> All Western states … have staff dedicated to ensuring that ongoing mine operations develop and follow appropriate reclamation plans.
>
> …
>
> Western states have a proven track record in regulating mine reclamation in the modern era – including for hard rock mines – having developed appropriate statutory and regulatory controls, and are dedicating resources and staff to ensure responsible industry oversight.

WGA, Policy Resolution 2014-07 ("Bonding for Mine Reclamation"). Thus, while the National Academy of Science/NRC confirms that hardrock mine regulation on federal lands is "generally effective," the Western Governors' Association confirms that the Western States' hardrock mine regulation is also "protective of human health and the environment." Collectively, this means that all Western lands, federal and state (including private) lands are covered by adequate regulations regarding hard rock mining.

Thus, since it has been well-established that state regulatory and policy regulation of hardrock mining protects human health and the environment, it is important to also ensure that such regulation is protective of the state public finances, as well.

In 2014, the WGA correctly determined regarding the Western mining states that:

> An important component of a state's oversight of mine reclamation is the requirement that mining companies provide financial assurances in a form and sufficient to fund required reclamation if, for some reason, the company itself fails to do so [often referred to generically as "Bonding"].
>
> …

> All Western states have developed regulatory bonding programs to evaluate and approve the financial assurances required of mining companies. The states have developed the staff and expertise necessary to calculate the appropriate amount of the bonds, based upon the unique circumstances of each mining operation, as well as to make informed predictions of how the real value of current financial assurance may change over the life of mine, even post-closure.

WGA, Policy Resolution 2014-07 ("Bonding for Mine Reclamation"). These are powerful Bi-Partisan collective gubernatorial determinations made over a period of recent years. Importantly, these statements by Western State political leaders are well-supported by the independent factual record.

3.4 Current hardrock mine regulation is protective of the environment on all federal and state Western lands – A Summary

In 1999, federal hardrock mine regulation programs of the USFS and the BLM were deemed to be "generally effective" in protecting the environment by the National Academy of Science/National Research Council. In 2011, Senator Murkowski's investigation of the BLM and Forest Service mine regulation experience verified and updated the 1999 NAS/NRC determination. And the Bipartisan Western Governors' Association has determined that the state hardrock mine regulatory programs were both "protective of human health and the environment" and protective of public treasuries.

Importantly, such regulatory "treasury protection" does not even consider the major additional public benefit of mining revenue from state revenue from taxes, severances taxes, and employee income taxes, among other sources, which are substantial since <u>mining jobs</u> (i) are traditionally <u>some of the highest paying hourly wages</u> in any state (ii) like any industrial enterprise, <u>have substantial job multiplier effects on supporting business and employment</u> and (iii) typically <u>produce products that are the necessary inputs for US manufacturing</u>.

Nevertheless, it is reasonable to ask, "Why is hardrock mine regulation so effective now, when historic operations created significant problems?" Obviously, as discussed above, part of the answer is simply that prior to 1970 (i.e., the Pre-Regulatory Era) there was no significant environmental regulation of hardrock mines. However, it is also important to recognize that prior to 1970 there was also no significant environmental regulation of municipal waste or municipal sewage, nor was there any significant regulation of manufacturing environmental impacts. The "bottom line" is that the American culture has now made environmental protection a priority value – not only for the hardrock mining industry, but also for local communities, industry, the regulatory community, and the public. Therefore, unlike in decades gone-by, public, private and NGO managers are now paying close attention to hardrock mining environmental issues that did not even show up on the policy "radar screen" prior to 1970.

4.0 Changing Societal Values – The Great Depression, World War II, the Cold War, and the the Modern Environmental Movement

4.1 Prior to 1970, there was virtually no direct regulation of municipal sewage, industrial wastes or hardrock mines.

Prior to 1970, there was no significant regulation of hardrock mines at either the federal or state level. Mining was not an exceptional activity in this regard. Prior to 1970 there was very little direct regulation of municipal sewage or industrial waste discharges. The early federal water pollution control laws were primarily construction grants programs that were public works projects subsidizing certain activities, but these were not regulatory prohibitions. Rivers, lakes and other water bodies were deliberately used to dispose of all types of septic, chemical and industrial wastes.

Prior to 1970, government and industrial managers did not "see" environmental pollution as a problem or they simply did not know what to do about it. In 2017, this may seem incomprehensible. However, if one briefly reviews our history leading up to this point, one can quickly understand how the culture reached this point. More importantly, for the purpose of this report, in part, it explains why the regulatory omissions of the past will not be repeated, even without specific regulatory prohibitions.

4.2 Societal Values of "The Greatest Generation"

Tom Brokaw's iconic 1998 book *The Greatest Generation*[13] describes the generation of American who came of age in the poverty of the Great Depression and went on to fight World War II, the Korean War, the Cold War, and then participated in generating an era of comparative affluence in the 1950s and 1960s. The deprivation of the Great Depression created a culture in which jobs and manufacturing production were the primary concerns. Belching industrial smokestacks symbolized prosperity in one town, while clean air in the next town symbolized factory closure and unemployment. For example, in 2016, it is now ironic to note with regard to a historic smokestack at a Hoover vacuum manufacturing facility that:

> … the Hoover Co. understood the value of the tall chimney promoting the burgeoning company at a time when companies took pride in the height of their smokestacks. While today they may represent industrial pollution, in that era, the image of the black billowing smoke from a tall chimney stack represented prosperity. 'They wanted it to be a symbol of their company by putting their name on it,' Fernandez said. 'Every time somebody would take a picture of North Canton [Ohio], that chimney is in the picture.' 'It's certainly symbolic.'

"Iconic Hoover Smoke Stack to be Restacked," Robert, Wang, The Canton Repository, December 4, 2014. Obviously, this describes a very different set of values from the environmental values that are foundational to the US in 2017.

[13] Brokaw, Thomas, The Greatest Generation, Random House, New York, 1998.

The economic desperation of the Great Depression focused both public and private values upon the primary mission of finding ways to generate employment, manufacturing production and material prosperity to the exclusion of almost all other societal values. Thus, for example, when President Roosevelt's New Deal promoted multiple massive government dams on the Columbia River and Tennessee River systems progressive folk hero Woody Guthrie celebrated these achievements with songs like "Roll On, Columbia, Roll On" and "Grand Coulee Dam" unabashedly supporting such projects without any apparent concern about the associated major environmental, social or First Nation impacts. "Environmental concerns," as we now understand them were not part of the mainstream culture. The American culture of the Great Depression was one that necessarily worshiped jobs, production and material prosperity above all other values. These traits became even more deeply embedded into the American cultural fabric by the advent of World War II ("WWII") and its precursor events.

Strategically, WWII was to be won or lost based not just upon the bravery and sacrifice of soldiers, sailors and airmen, but also by delivering a crushing weight of one nation's gross national product ("GNP") onto the enemy nation. At the time, the United States excelled at this form of industrial warfare. At the time, the US could generate GNP quickly and in vast quantities of material, and the US did exactly that. Idled factories were brought back to smoking productively, while liquid (and solid) industrial wastes were conveniently disposed in the waterways behind these same plants.[14] Massive new industrial production facilities were conceived of and brought into production within months, not years. Enormous new manufacturing plants were constructed to build aircraft, ships, tanks, trucks, weapons and munitions, to name just a very few of the critical implements of war. Whole new cities were constructed, seemingly overnight, to meet various production goals, and indeed, the "Manhattan Project" developing atomic weapons built new towns and industrial facilities like Oak Ridge, Tennessee and Los Alamos, New Mexico in secret, without any oversight other than that that ensured production was achieve ASAP. There was no "permitting" of any of these great public works, and little or no consideration of environmental values.

Critically, all manufacturing requires mineral inputs as primary material ingredients and the wartime plants consumed the products of hardrock mines voraciously, demanding immediate expansion of the hardrock mining industry during WWII without regard to environmental impacts.

The federal government's direct orders and subsidies spurred the hardrock mining industry into what was the greatest periods of the industry's expansion in the shortest possible time. Providing immediate production, and lots of it, was the driving societal value. Generating GNP to deliver its brutal impact upon enemy nations was imperative. Indeed, *everyone* knew that American lives depended upon this industrial production, including the primary contribution of the hardrock mining industry. (Mining is referred to as being a "primary industry" for good reason!) Environmental values, as we now

[14] Obviously, the US could not duplicate these same achievements at this time.

understand them, were pushed to an obscure corner, or more typically, such values simply did not influence federal decision-making whatsoever.

Perhaps, no single visual image captures the difference in attitudes between this period and the present than the 1943 Pennsylvania Railroad calendar art by Dean Cornwell showing a PRR steam locomotive highballing past a massive steel mill belching fire and smoke, a munitions train on the foreground track, full coal hopper cars in the background and a pile of iron ore set to be charged into the steel production furnaces. Uncle Sam looms huge in the background, rolling up his sleeve to get down to work. There is no mistaking the message, even in 2017. In 1943, the Pennsylvania Railroad was proudly displaying the pollution it generated to help win World War II.

Nor did the post-WWII culture quickly change from its intense wartime focus on material production to the exclusion of other values. The Union of Soviet Socialist Republics (USSR), a World War II ally, immediately became the new "Cold War" enemy. Additionally, Communist China, also a then-recent WW II ally became a frightening new enemy in very real "hot" war in Korea in 1950. The Soviet Union's surprisingly swift development of nuclear weapons only exacerbated US concerns. Not only were many WWII attitudes of the USA about the production ethos maintained, but indeed many of the WWII industrial and mineral production subsidies were maintained through the Korean War, and for some time thereafter. Indeed, the most far-reaching federal statute explicitly supporting U.S. mineral production was passed during this period, i.e., the U.S. Defense Production Act of 1950.

If a town was in the way of the growth of mine production, then the town had to move, in whole or in part, as witnessed, e.g., at Butte, Montana or at Bingham Canyon Utah. Other values, be they cultural or environmental, were secondary to overall societal production needs. And, indeed, the core values of production, employment and prosperity continued well into the 1960s.

> In the 1960s, before the crises of energy shortages, sprawl, air and water pollution, and post-industrial economic restructuring gripped urban and rural places across America, unlimited growth was a primary goal of many communities. Growth, both economic and demographic, was a mark of progress, a source of pride, and a centerpiece of many communities' identifies.

Greenow, Linda, 2004, "When Growth was Good: Images of Prosperity in Mid-Twentieth Century America, Middle States Geographer, 2004, 37:pp. 53-61, p. 53.

In short, the current culture of the USA has embedded environmental values into all aspects of policy-making. In contrast, "The Greatest Generation" had no such luxury in the 1930s, 1940s or 1950s. The 1960s reaction to such attitudes is understandable. However, it is not only the hardrock mining industry that had to change and incorporate such values, it was society as a whole that had to make these changes. And, such

changes, did in fact occur, in the public, the government, and the hardrock mining industry.

4.3 Cultural Balance

Fear of unemployment, fear of war, and fear of losing wars were all factors that pushed the United States far into the public policy mode of production-at-all-costs during most of the Twentieth Century. Environmental values were almost entirely ignored regarding industrial production until 1970. Indeed, such values were rarely even articulated. At the time, the pendulum had swung too far in the direction of industrial production at all cost, which led to unnecessarily high costs to natural and environmental values. However, times *were* changing in the 1960s and 1970s. With the prosperity of the 1950's and 1960's, other values could and did enter or re-enter the American culture … including environmental values.

4.4 The Modern Environmental Movement

There is no single event that marks the beginning of the environmental movement, but there are a series of events that collectively altered the mix of cultural norms regarding jobs, production, pollution, and the environment. Concerns about nuclear arms and the effects from nuclear fallout (e.g., strontium 90) from bomb testing raised consciousness about the "environment" in the 1950s. The controversy surrounding the proposal of several major dams on the Colorado River system provided a focus for environmental values in the late 1950s, perhaps most notably the work of the Sierra Club and David Brower to help thwart the building of the Echo Park Dam in Dinosaur National Monument. The 1962 publication of Rachel Carson's controversial book *Silent Spring* provided a counterpoint to the widespread use of chemicals in the U.S. and Dupont's "better living through chemistry" message. Shortly thereafter, changing values and changing politics allowed the passage of the landmark Wilderness Act of 1964. All of these and many other factors brought changes to America's culture and values.

America reached a symbolic turning-point on April 22, 1970, celebrated by the first Earth Day. The advent of the modern environmental movement was to generate major changes for the U.S. hardrock mining industry, and indeed, all of US industry, manufacturing, state and municipal government pollution. However, these changes were certainly not immediate, and many of the changes most applicable to hardrock mining, reclamation, environmental protection and financial assurances would take decades to develop and implement.

4.5 Cultural and Legal Changes Incorporating Environmental Values

The above discussion is provided to emphasize the extent and rapidity of the change in societal values that caught both government and industry off-guard in the 1970s. Prior to 1970, there was very little regulation of government or industrial pollution. Often, there was no regulation of pollution whatsoever. Even worse, the USA's pre-1970 values and norms were such that environmental values were not significantly impacting societal

decision-making in any way, because much of society did not even understand there was another way of conceiving of the world. In fact, it was only late in 1969 that the US enacted the National Environmental Policy Act of 1969 (NEPA), which was the forerunner of most modern federal environmental statutes.

Accordingly, there is nothing that can be learned about the effectiveness of current hardrock mine regulation by studying facilities that were designed or constructed prior to 1970. These facilities were designed, built and operated to maximize production and minimize cost, but hardrock mines permitted/approved after 1990 have been designed, built and operated to integrate long-term environmental closure and reclamation as a primary design standard, as required by current law and mining industry attitudes.

Importantly, as discussed immediately below, even though laws and attitudes were changing rapidly starting in the 1970s, there was certainly a very steep "learning curve" as both government and industry tried to cope with challenges of a sort that never had had to be addressed previously. This transition was hard for all concerned, and mistakes were made. For example, the infamous "Syringe Tide" of raw garbage and medical waste washed up onto New Jersey and Long Island beaches as late as 1988-1989 highlighted on-going municipal waste disposal practices, and indeed, well into the 1990s, New York City and various New Jersey communities were still ocean-dumping sewage sludge in the New York Bight and raw sewage via storm water overflow.

Fortunately, the Hardrock Mining Industry's transition problems was largely complete by 1990, and since 1990 environmental problems associated Hardrock Mining have been generally modest and manageable, as benchmarked, in part, by the lack of any new Western hardrock mines appearing on the CERCLA National Priorities List in the last 26 years.

Section 5.0, immediately below, provides a summary of the major environmental regulatory programs that have created the regulated hardrock mine era.

5.0 Development of Legally-Applicable Hardrock Mine Regulation

5.1 Regulation of the Natural Media Receptors – An Overview

Fundamentally, there are four major categories natural media that the environmental laws protect: (1) air; (2) surface water; (3) groundwater, and (4) land. As a practical matter, hardrock mining has not typically triggered significant scientific, policy or regulatory questions regarding air quality; therefore, this study does not evaluate hardrock mine regulation regarding protection of air quality.[16] Surface water quality protection has been

[16] For example, the only significant air quality policy issue that has arisen from hardrock mining concerns the emissions of mercury from gold mining operations in Nevada impacting Idaho dam-impounded reservoirs. However, these allegations were effectively discredited by the White Paper developed by the Idaho Association of Commerce and Industry/Idaho Council for Industry and the Environment Report "Sources and Receptors of Mercury in Idaho," January 28, 2009 ("Idaho Mercury Report"). Mercury in Idaho's waterways is primarily a result of geologic source mercury or legacy mining (i.e., historic mining

dominated by promulgation of federal statutory and regulatory programs, which then have typically been implemented by state agencies. On the other hand, ground water quality protection has been the province of State government with some specific notable exceptions.

Regulation of direct impacts to land (i.e., "reclamation") has been almost exclusively the province of the relevant land management authorities. The regulation of hardrock mine reclamation on National Forest System lands has been administered by the USFS since 1974, the regulation of hardrock mining on Department of Interior managed public domain lands has been administered by the BLM since 1981, and the regulation of state and private lands within a state are administered by the relevant state agency. Additionally, the integration of post-mining land use, continued protection of water quality and post-mining land uses following hardrock mine closure and reclamation, as well as bonding for these purposes, has been the unique province and expertise of the State and Federal Land management agencies. A brief history of these programs is provided below.

5.2 Surface Water

The Clean Water Act[17] was passed in 1972 and, among other things, created a requirement for a discharger of a "pollutant" to "navigable waters" (which later came to be more broadly defined as "waters of the United States") from a "point source" to obtain an NPDES permit.[18] In theory, the Clean Water Act, most particularly the NPDES permit system was one of the first federal laws potentially directly implementing regulation of hardrock mines. However, implementation was slow as EPA and the mining industry grappled with new concepts, new operational issues, and new regulatory concepts, including but not limited to programmatic litigation (see e.g., *U.S. Steel Corp. v. Train*, 556 F. 2d. 822 (7th Cir. 1977), and major statutory amendments[19] to address these issues. Thus, EPA did not promulgate 40 C.F.R. 440, Subpart J, concerning "Copper, Lead, Zinc, Gold, Silver, and Molybdenum Ores Subcategory," some of the most common Hardrock Mines, until December 1982. 47 FR 54609, Dec. 3, 1982.

Therefore, prior to 1982, EPA and delegated State programs had attempted to enforce on a case-by-case basis an inflexible and absolute "no discharge" requirement that did not take into account net contributions of rain and snow which contributed to unrealistic environmental evaluations that significantly contributed to environmental problems at early Transition Era hardrock mines. Thus, the very first practical federal regulatory scheme specifically regulating hardrock mine surface discharges did not even exist until the very end of 1982. Not surprisingly, sorting out the implementation of the NPDES program did not occur overnight.

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using historic mineral extraction technologies and practices long abandoned). Neither the EPA, nor the NGO's, have ever responded to the Idaho Mercury Report in writing.

[17] Technically, the Clean Water Act is the Federal Water Pollution Control Act Amendments of 1972, Pub. L. No. 92-500 (codified as amended at 33 U.S.C. Section 1251-1387.

[18] 33 U.S.C. Sections 1311(a), 1362(6), (7), (12), (14).

[19] 1977 Clean Water Act Amendments, Pub. L. No. 95-217, 91 Stat. 1581 (codified as amended in scattered sections of 33 U.S.C.)

5.3 Groundwater Protection at Hardrock Mines

5.3.1 State Protection of Groundwater at Hardrock Mines

Groundwater regulation is generally held to be the unique province of state government. Groundwater, unlike surface water, does not readily migrate across State borders. Thus, while the federal definition of "waters of the United States" has been construed broadly, it has not generally been construed to regulate groundwater. As the American Law of Mining states, "[t]he Clean Water Act makes a clear distinction between navigable waters on the one hand and groundwater on the other."[25]

Therefore, state hardrock mine regulation has emerged as the primary regulatory tool for preventing or otherwise regulating potential hardrock mining impacts to groundwater. However, these programs have been relatively recent developments (i.e., since 1990). For example, the Nevada "Mining Facilities" regulation explicitly protects against and regulates discharges to groundwater from mining facilities were promulgated on September 1, 1990.[26] And although Idaho's Ground Water Quality Plan became law in 1992,[27] it was not until 1997 that a detailed and comprehensive enforcement mechanism was promulgated. See IDAPA 58.01.11, 3-20-1997 ("Ground Water Quality Rule"). Alaska's Hardrock mine reclamation was codified and promulgated in 1991. Washington's Metal Mining and Milling Act protects against potential discharges to groundwater and was passed in 1994.[28]

Thus, comprehensive direct preventative regulation of potential groundwater impacts of hardrock mine regulation was only initiated in the 1990s.

5.3.2 Federal Protection of Groundwater at Hardrock Mines

The Clean Water Act regulates discharges from hardrock mines, to "waters of the United States," and as discussed above, this is generally limited exclusively to surface water discharges. Certain Federal programs, including the Safe Drinking Water Act,[29] the federal Resource Conservation and Recovery Act[30] and Uranium Mill Tailings Radiation Control Act of 1978[31] regulate specific, narrowly defined activities potentially relevant to hardrock mines. The federal public lands agencies (i.e., the Forest Service and the BLM) incorporate state groundwater standards into NEPA compliance and mitigation. Nevertheless, as discussed below, since these state programs were devised in the 1990s, even explicit federal incorporation of state groundwater standards did not provide significant preventative groundwater regulation until, at least 1990. EPA has confirmed this to be true.

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[25] 5 Am. L. of Mining Section 169.02[2][c] (2d ed.)
[26] NAC 445A.350 et seq.
[27] See Idaho Groundwater Plan, Section II-C, Senate Bill 1321 (1992).
[28] Wash.Rev.Code 43.21.
[29] Safe Drinking Water Act, 42 U.S.C Sections 300 et seq.
[30] Resource Conservation and Recovery Act, 42 U.S.C. Sections 6901 et seq.
[31] Uranium Mill Tailings Radiation Control Act of 1978, 42 U.S.C. Section 7901 et seq.

EPA's assessment of groundwater protection at hardrock mine in 1985 was as follows:

> Ground-water monitoring is difficult, expensive, and has seldom been conducted at mine sites on a comprehensive basis. Because of complex geologic strata (presence of an ore body) and the extensive size of many mine properties, proper ground-water monitoring is technically difficult and costly. Historical practice in the mining industry has not required such monitoring. As a result, there is very little available information in the literature, and almost none on a complete or comprehensive basis. Most mines have no historical or contemporary ground-water monitoring information.

RTC I, p. 6-7 (emphasis in original). In short, as late as 1985 EPA asserts that groundwater protection at hardrock mine sites was virtually nonexistent. Thus, per EPA's own study of the hardrock mining industry, one cannot rationally gauge the current effectiveness of hardrock mine regulation regarding groundwater protection with reference to sites designed and approved before 1985.

Accordingly, in the 1980s, federal regulation hardrock mining for protection of groundwater was limited, and virtually non-existent. This left the subject of groundwater regulation at hardrock mines to the state governments. The Western States stepped-up to manage this area in the 1990s, generally as part of mining specific statutes or regulations, and eventually tied directly to hardrock mine reclamation programs and financial assurance requirements.

5.4 Hardrock Mine Reclamation, Financial Assurances and Water Quality Protection

In 1974, the Forest Service promulgated regulations governing reclamation and performance bonding of hardrock mines on National Forest System Lands.[32] These were some of the first regulations governing Hardrock Mine reclamation promulgated by any agency, federal or state. In 1981, the BLM promulgated the surface management regulations applicable to Mine Plans of Operations ("MPOs") similar in concept to those of the Forest Service. The history of the impact and evolution of these programs is described in greater detail by Northwest Mining Association's "The Evolution of Federal and Nevada State Reclamation Bonding Requirements from Hardrock Exploration and Mining Projects: A Case History Documenting How Federal and State Regulators Used Existing Regulatory Authorities to Respond to Shortcomings in the Reclamation Bonding Program," prepared by Jeffrey V. Parshley and Debra W. Struhsacker, January 2008. That study documents federal and state interagency and industry cooperation by which hardrock mine regulation worked to create the currently effective hardrock mine regulation in Nevada; however, a similar history is reflected in most of the western mining states, as discussed above.

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[32] 36 CFR Part 228 (2016).

However, hardrock mine regulation is certainly not only about the Forest Service and the BLM. The Western States have regulated hardrock mining for decades. For example, both Idaho and Colorado had mined land reclamation programs that dated back to the 1970s. Initially these programs, like those of the Forest Service and the BLM focused on regrading and revegetation of mined lands, and not on surface water quality and certainly not ground water protection. Indeed, initially, the Forest Service deferred protection of surface water to EPA enforcement of the Clean Water Act and EPA oversight of delegated state Clean Water Act programs, which gave rise to two of the most notorious hardrock mine regulatory failures during the Transition Era (1970-1990), specifically Summitville, Colorado and Zortman, Montana. Thus, it became clear to the BLM, the Forest Service and the Western States that closure, reclamation, post-mining land uses and water quality had to be integrally-related and "bonds" posted.

Accordingly, the current reclamation bonding programs are working very well. Not only are Regulated Hardrock Mines (i.e., post-1990) avoiding EPA CERCLA National Priorities List, but even more importantly, existing financial assurances (federal and state) are avoiding public liability, even when defaults have occurred. For example, in the co-authors' home states of Idaho and Nevada, there has never been a Hardrock Mine that was approved and for which financial assurances were posted that defaulted on the financial assurances such that the Mine was not closed and reclaimed in accordance with: (1) the reclamation/closure plan approved by the relevant federal and/or state agencies; and (2) the financial assurances retained by the agencies. This is discussed in greater detail below.

In Idaho, two relatively large hardrock mines in Idaho defaulted on their bonds in the 1990s such that the public agencies had to rely on financial assurance monies to close and reclaim the properties. Even though both mines dated from the Transition Era (i.e., pre-1990), in both situations (specifically, Dakota Mines-Stibnite and Black Pine), the bond amounts proved to be adequate. Interestingly, these two mines had been identified by Earthworks' (one of the CERCLA 108(b) plaintiffs) as being insufficiently bonded.[33] Earthworks was wrong, by a factor of ten. More specifically, Earthworks' stated that adequate bonding for each of these mines would be about $50,000 per acre; in fact, Dakota Stibnite and Black Pine were closed and reclaimed for $2,710 per acre and $7,383 per acre respectively.[34] In short, it is objectively demonstrable that any factual assertions by Earthworks are insufficiently grounded to be given serious consideration in any EPA rulemaking.

Nevada has the nation's largest and arguably the most successful state hardrock mine environmental closure and reclamation program. In part because it started later, Nevada developed water quality protection and land reclamation into an integrated and "bonded" hardrock mine program, essentially from the beginning. Nevada's "Mining Facilities" regulations protecting waters of the state (surface and groundwater) were promulgated in 1989, and then in 1990 the Nevada legislature passed the Nevada Reclamation Act. In

[33] Letter, Baird Hanson William LLP to USFS Salmon-Challis Nation Forest, May 24, 2007
[34] Thus, Earthworks and their NGO colleagues have been are fully informed of the adequacy of existing hardrock mine financial assurances for 20 years.

the mid-to-late 1990s, two permitted mines (Goldfields and Mt. Hamilton) defaulted on their "bonds," which were adequate but not immediately available for necessary water system management. This prompted voluntary efforts on the part of the Nevada mining industry to act to prevent any interim spills and this caused the Nevada Mining Association to seek a change in Nevada law to allow for immediate NDEP access to "fluid management bonding." This problem has never recurred.

Thus, every Idaho and Nevada hardrock mine (including those that have been in default) that was approved and subject to financial assurances has been closed and reclaimed in accordance with: (1) the reclamation/closure plan approved by the relevant federal and/or state agencies; and (2) the financial assurances retained by the federal and/or state agencies.

Once states and/or federal land management agencies (i.e., the Forest Service and the BLM) integrated mine reclamation with surface water and ground water protection, geochemical prediction and financial assurance for such activities and related predictions, the chances of such facilities replicating the problems that arose in the Pre-Regulatory Era (Per-1970) became essentially impossible to duplicate ... and, indeed, such problems have not been recreated to date.

Thus, certain Transition Era (1970 through about 1990) hardrock mines created problems. There is no question there has been a "learning curve." State agencies began to create active groundwater management programs regulating hardrock mines that might impact ground water. And, the Forest Service and the BLM began to work in concert with the relevant states, as all parties sought to incorporate comprehensive surface and groundwater protection into NEPA planning, Mine Plan of Operation approvals and reclamation bonding programs to create regulatory programs that prevented the creation of water pollution in the first place and bonded for such protection from the outset of mining operations. This took time, but it was achieved. And, the most important single element is that since 1990, design, permitting, construction, operation, closure and reclamation of hardrock mines are integrated.

Initially, Western States hardrock mine regulation was limited to regrading and re-vegetation, similar to the early Forest Service and BLM programs. However, after water quality impacts were identified famously at hardrock mines at Zortman and Summitville, then the primary federal land management agencies (i.e., the Forest Service and BLM) shifted from reclamation as a merely regrading and revegetation exercise to comprehensive sustainable surface and ground water quality protection.

5.5 The National Environmental Policy Act of 1970

Nominally, the passage of the National Environmental Policy Act of 1969 (NEPA) was potentially applicable to hardrock mines and therefore could have heralded an immediate major shift in hardrock mine regulatory policy. In fact, initially, it did not. NEPA requires a "proposal" of a "major federal action" (including potentially approval of a

Mine Plan of Operation) "significantly affecting the environment."[35] Thus, NEPA regulation of hardrock mining typically is triggered by the filing of a request for an MPO with the Forest Service, the BLM or the EPA (for an NPDES permit). In fact, in the 1970's and 1980's there was significant state-by-state debate regarding whether the approval of a single hardrock mine constituted a "major" Federal action that was subject to NEPA, but it was not until 1995 that the first hardrock mine Environmental Impact Statement was issued in Nevada. Nevertheless, when it became clear that EPA and state NPDES jurisdiction could not adequately manage surface discharges as stand-alone issues at Zortman and Summitville, the Forest Service and the BLM used their Mine Plan of Operation approval processes to create comprehensive and integrated water quality protection for hardrock mines. Clearly, there were regulatory gaps that had to be addressed. This was part of the learning curve that delayed effective hardrock mine regulation until the 1990s. In fact, regarding current hardrock mine regulation, NEPA EIS evaluation of the environmental impacts and mitigation measures has become a major aspect of any hardrock mine approval with a federal nexus.

Nevertheless, prior to 1990, NEPA had little relevance to hardrock mine regulation.

5.6 Evaluation of the Effectiveness of Hardrock Mine Regulation based upon the Timing of Regulatory Developments

The above discussion provides a short jurisdictional history of the regulation of hardrock mining. To briefly summarize, there was literally no regulation and therefore no regulatory consideration of the environmental impacts of hardrock mining prior to 1970, so any site designed and constructed prior to this date provides no information about the effectiveness of hardrock mine regulation. NEPA was signed into law in 1970, but NEPA required other federal authorities and case law to be interpreted before NEPA could be implemented at hardrock mines. Accordingly, it is misleading, disingenuous, and certainly "arbitrary and capricious" to evaluate environmental issues associated with hardrock mines designed and operated prior to 1970 as examples of current hardrock mine regulation.

EPA's hardrock mine NPDES program was not published until 1982, and took years after that to properly implement the program. As discussed above, federal agencies were generally precluded from infringing upon state control of groundwater, and groundwater programs regulating hardrock mines were largely the product of the 1990s. Thus, it was not until the 1990s that federal and state agencies began to comprehensively address the water quality issues associated with hardrock mining.

EPA confirms this state of affairs when it stated in 1985 that:

> During active site life, during closure, and in the post-closure period, facilities could employ engineering controls to prevent erosion, to keep leachate out of the ground water, or to remove contaminants introduced into ground water. However, EPA data on management methods at mining

[35] American Law of Mining, Section 167.02.

facilities indicate that only a small percentage of mines currently monitor their ground water, use run-on/runoff controls or liners, or employ leachate collection, detection, and removal systems. EPA has not determined the circumstances under which these waste measures would be appropriate at mine waste and mill tailing disposal sites.

RTC I, p. ES-10. It is only after 1990 that the lessons learned from the 1970 to 1990 Transition Era began to be more fully incorporated in the mine regulatory processes. Thus, it has only been in the last 20 years that hardrock mine permitting has first begun to more fully evaluate, predict and regulate long term water quality impacts.

The bi-partisan Western Governors' Association has characterized the situation as follows:

...

3. While older mines in western states have sometimes had harmful impacts on adjacent waters, the mining industry has improved its operation and reclamation track record in recent decades, to avoid or minimize such impacts.
4. Recent decades have also brought heightened attention to the importance of mine reclamation from state regulators across the west. All western states that host hardrock mining industries now have staff dedicated to ensuring that on-going mine operations develop and follow appropriate reclamation plans.

WGA, Policy Resolution 2011-4 (A)(3) and (4).

> All Western states have developed regulatory bonding programs to evaluate and approve the financial assurances required of mining companies. The states have developed the staff and expertise necessary to calculate the appropriate amount of the bonds, based upon the unique circumstances of each mining operation, as well as to make informed predictions of how the real value of current financial assurance may change over the life of mine, even post-closure.

WGA, Policy Resolution 2014-07 ("Bonding for Mine Reclamation"). In fact, the "bottom line" on the adequacy of hardrock mine regulation is fairly simple. Until changing societal cultural norms regarding environmental protection and Hardrock Mine regulation began to be implemented by federal and state regulatory agencies environmental problems arose. Since 1990 after federal and state agencies began paying attention with a degree of technical experience, the EPA has yet to designate even a single Western hardrock mine site to the National Priorities List.

The key to effective hardrock mine regulation is that there is *some* form of evaluation and planning. Neither the goals, nor the science, are that difficult to implement. It takes planning and application of existing knowledge. Almost all of the hardrock mines giving rise environmental problems on the CERCLA NPL arose when environmental goals and planning were nonexistent in the Pre-Regulatory Era (Pre-1970). And, while a few CERCLA NPL problems arose in the Transition Era (1970 through 1990) when practical experience was wholly-lacking, in the Regulatory Era (Post-1990) there have been no

Western hardrock mine sites that EPA has deemed to be a sufficient problem to require nomination to the National Priorities List.

6.0 Conclusion

The federal and state regulation of hardrock mining and milling facilities is a remarkable success story of changing law and policy environmental protection that is well-illustrated by the vintage of hardrock mines on the United States Environmental Protection Agency ("EPA") National Priorities List of environmental cleanup sites. To briefly summarize, there has never been an environmental problem at a Western hardrock mine that was approved by a federal or state agency in the West after 1990 that has required EPA to make such hardrock mine a Superfund "top priority among known response targets." To reiterate, no hardrock mine permitted in the West after 1990 has ever been placed on EPA's Superfund National Priorities List.

Current hardrock mine regulation on federal lands managed by the United States Forest Service and the Bureau of Land Management has been determined to be "complicated, but generally effective" by the federal government's independent National Academy of Sciences National Research Council in 1999. In 2011, Senator Murkoswki's investigation of the BLM and Forest Service mine regulation experience verified and updated the 1999 NAS/NRC determination. And, the Bi-partisan Western Governors' Association has stated that the Western states, which regulate Hardrock Mining on state and private lands within their borders "… impose permit conditions and stringent design and operating standards, to ensure that hardrock mining operations are conducted in a manner that is protective of human health and the environment" and that Western "… states have developed the staff and expertise necessary to calculate the appropriate amount of the bonds, based upon the unique circumstances of each mining operation, as well as to make informed predictions of how the real value of current financial assurance may change over the life of mine, even post-closure." WGA, Policy Resolution 10-16, Background (A)(8) ("National Minerals Policy"). Moreover, all programs of the federal and state agencies have continued to strengthen their reclamation and bonding programs on an ongoing basis.

The above-described regulatory success story is a direct result of society's change in values both outside of, and within, the hardrock mining industry to seek protection of the environment, not just to creates jobs, industrial production and tax revenue. Hardrock mines designed and built prior to 1970 were developed to maximize production and minimize cost with little or no regard for environmental values. After 1990, new hardrock mines have been designed, built and operated to integrate long-term environmental closure and reclamation as a primary design standard, as required by current law.

The above-described changes in values, law, design, permitting, operation closure and reclamation have had a major impact on the adequacy of financial assurances posted pursuant to routine individual financial assurances on a mine by mine basis. Using the co-authors' home states as examples, there has never been an Idaho or Nevada hardrock

mine for which financial assurances were posted that defaulted on the bonding such that the hardrock mine was not closed and reclaimed in accordance with: (1) the reclamation/closure plan approved by the relevant federal and/or state agencies; and (2) the financial assurances retained by the agencies. Thus, objectively, the existing regulation of hardrock mines is protecting the environment from releases and protecting public treasuries through posting of adequate financial assurances.

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MEMORANDUM

TO: Mr. Joe Baird – Baird Hanson LLP

FROM: Mr. Richard DeLong RFD

DATE: May 15, 2015

SUBJECT: Assessment of Mining and Milling Site on the National Priorities List

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At your request, Enviroscientists, Inc. (Enviroscientists) completed an assessment of the United States Environmental Protection Agency's (EPA's) National Priorities List (NPL) for Mining and Milling Sites (MMS). A search of the NPL was completed on April 21, 2015. See Attachment A for a printout of the list. In addition, a compact disk (CD) with the searchable excel version of the printout is included with is memorandum.

There are over 1,100 sites on the NPL. Of those, there are 100 that the EPA has classified as MMS. However, only 55 of those sites are actual mining operations where mineral resources were extracted from the earth. The other 45 are mineral processing facilities where a mineral product is delivered to the operation for further processing. The 55 "Hardrock Rock" MMS on the NPL fall into the following temporal classifications: 49 are prior to 1970; five are from 1970 through 1990; and one is post-1990. The one operation that was permitted and began operations post-1990 is the Barite Hill property in South Carolina. The operation was an open pit heap leach mine that ceased operation in 1995 and reclamation was completed in 1995 to 1999.

ATTACHMENT A

MAY 2013 VERSION OF THE MINING AND MILLING SITES ON THE NATIONAL PRIORITY LIST

Table 1

Summary - Mining and Milling Sites on the National Priorities L
Source: EPA AML - Status = "Final" as of May 2013 Update (list check April 21, 2

The EPA AML program defines AMLs as:

"Those lands, waters, and surrounding watersheds contaminated or scarred by extraction, beneficiation or processing of ores and minerals, including phosphate but not coal*. Abandoned mine lands include areas where mining or processing activity is temporarily inactive."

	Site Name	EPA Region	State	Year Start	Year End	Year End	Design/Approval 1 - pre 1970 2 1970 - 1989 3 - 199 and later	Mining/Milling or Other Processing	Type of Activity	Minerals	NPL Status	Site/CERCLIS ID Number
1	CALLAHAN MINING CORP	1	ME	1880's	1972	1972	1	M	Mining/milling (Open pit mine)	Zinc/copper	Final	MED980524128
2	ELIZABETH MINE	1	VT	early 1800s	1958	1958	1	M/O	Mining; copper smelting	Copper	Final	VTD988366621
3	ELY COPPER MINE	1	VT	1821	1920	1920	1	M/O	Mining/cobbing/roasting/smelting; (removal of ore)	Copper	Final	VTD988366571
4	PIKE HILL COPPER MINE	1	VT	1847	1919	1919	1	M	Mining	Copper	Final	VTD988366720
5	LI TUNGSTEN CORP.	2	NY	1940's	1984	1984	1	O	**Processing** (Received tungsten ore's for processing).	Tungsten	Final	NYD986882660
6	MAYWOOD CHEMICAL CO.	2	NJ	1916	1955	1955	1	O	**Processing** (radioactive thorium ore).	Thorium	Final	NJD980529762
7	SHIELDALLOY CORP.	2	NJ	1955	2006	2006	1	O	**Processing** (discharge to unlined pits prior to 1970 enforcment actions).	Chromium alloy	Final	NJD002365930
8	U.S. RADIUM CORP.	2	NJ	1915	1926	1926	1	O	**Processing**/Tailings	Radium	Final	NJD980654172
9	W.R. GRACE & CO., INC./WAYNE INTERIM STORAGE SITE (USDO	2	NJ	1948	1971	1971	1	O	**Processing**/extraction	Monazite ore (thorium/rare earths)	Final	NJ1891837980
10	FOOTE MINERAL CO.	3	PA	1942	1991	1991	1	O	**Processing**/Manufacture of metal products	Lithium	Final	PAD077087989

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11	FRANKLIN SLAG PILE (MDC)	3	PA	1950's	1999	1999	1	O	MDC Industries sold the **processing** slag as sand blasting grit for 40 years. MDL Abandoned site 12/30/1999. Franklin Smelting and Refining Co smelting the ore. (lead contamination)	Copper	Final	PASFN0305549
12	JACKS CREEK/SITKIN SMELTING & REFINING, IN	3	PA	1958	1977	1977	1	O	Smelting **processing** and precious metals reclamation	Precious metals	Final	PAD980829493
13	PALMERTON ZINC PILE	3	PA	~1912	1982	1982	1	O	Smelting **processing** (NJ Zinc Co.)	Zinc	Final	PAD002395887
14	U.S. TITANIUM	3	VA	1931	1971	1971	1	O	Refining **processing** titanium ore/Titanium dioxide manufacturing	Titanium	Final	VAD980705404
15	BARITE HILL/NEVADA GOLDFIELDS	4	SC	1991	1995	1995	3	M	Mining (gold plant, heap leach)	Gold, Silver	Final	SCN000407714
16	BREWER GOLD MINE	4	SC	1828	1995	1995	1,2	M	Mining - CN heap leach pad 1987 - 1995.	Gold	Final	SCD987577913
17	MACALLOY CORPORATION	4	SC	1941	1998	1998	1	O	Ferrochromium alloy **processing** plant	Ferrochromium	Final	SCD003360476
18	NATIONAL SOUTHWIRE ALUMINUM CO.	4	KY	1969	active	active	1	O	Aluminum **processing** (north pond)	Aluminum	Final	KYD049062375
19	ORE KNOB MINE	4	NC	1850s	1962	1962	1	M	Mining, roasting, smelting	Copper	Final	NCN000409895
20	STAUFFER CHEMICAL CO. (TARPON SPRINGS)	4	FL	1950	1981	1981	1	O	**Processed** elemental phosphorous from phosphate ore.	Phosphate	Final	FLD010596013

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	Site Name	EPA Region	State	Year Start	Year End	Year End	Design/Approval 1 - pre 1970 2 1970 - 1989 3 - 1990 and later	Mining/Milling or Other Processing	Type of Activity	Minerals	NPL Status	Site/CERCLIS ID Number
21	ASARCO TAYLOR SPRINGS	5	IL	1911	active	active	1	O	Zinc smelting/**Processing** zinc oxide	Zinc	Final	ILN000508170
22	DEPUE/NEW JERSEY ZINC/MOBIL CHEMICAL CORP	5	IL	1903	1990	1990	1	O	Zinc smelting/**Processing**/Phosphate fertilizer	Zinc	Final	ILD062340641
23	EAGLE ZINC CO DIV T L DIAMOND	5	IL	1923	2003	2003	1	O	**Processing**/zinc smelting	Zinc/Cadmium	Final	ILD980606941
24	HEGELER ZINC	5	IL	1906	1954	1954	1	O	Zinc smelter/**Processing**	Zinc	Final	ILN000508134
25	MATTHIESSEN AND HEGELER ZINC COMPANY	5	IL	1858	1978	1978	1	O	Zinc Smelter (smelter closed 1961)/ **Processing**	Zinc	Final	IL0000064782
26	ORMET CORP.	5	OH	1956	2005	2005	1	O	Aluminum reduction (unlined pits closed 1981)/ **Processing**	Aluminum	Final	OHD004379970
27	TORCH LAKE	5	MI	1890	1969	1969	1	M	Mining (copper mines dumped tailings into lake).	Copper	Final	MID980901946
28	U.S. SMELTER AND LEAD REFINERY, INC	5	IN	1920	1985	1985	1	O	Smelter/**Processing**	Lead	Final	IND047030226
29	CHEVRON QUESTA MINE (MOLYCORP)	6	NM	1920	Active (underground blockcave 1983 to present)	active	1,2	M/O	Mining/Milling	Molybdenum	Final	NMD002899094
30	CIMARRON MINING CORP.	6	NM	1960	1982	1982	1,2	O	Milling	Iron; Precious metals	Final	NMD980749378
31	HOMESTAKE MINING CO.	6	NM	1958	1990	1990	1	O	Milling	Uranium	Final	NMD007860935

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	Site Name	EPA Region	State	Year Start	Year End	Year End	Design/Approval 1 - pre 1970 2 1970 - 1989 3 - 199 and later	Mining/Milling or Other Processing	Type of Activity	Minerals	NPL Status	Site/CERCLIS ID Number
32	TAR CREEK (OTTAWA COUNTY)	6	OK	1850	1970s	1970	1	M	Mining district	Iron, Zinc	Final	OKD980629844
33	TEX-TIN CORP.	6	TX	1941	1989	1989	1	O	Smelter/**Processing**	Tin, Copper	Final	TXD062113329
34	TULSA FUEL AND MANUFACTURING	6	OK	1914	1925	1925	1	O	Smelter/Roaster/**Processing**	Zinc/lead	Final	OKD987096195
35	UNITED NUCLEAR CORP.	6	NM	1967	1986	1986	1,2	M/O	Mining/**Processing**/milling	Uranium	Final	NMD030443303
36	ANNAPOLIS LEAD MINE	7	MO	1920	1940	1940	1	M	Mining	Lead	Final	MO0000958611
37	BIG RIVER MINE TAILINGS/ST. JOE MINERALS CORP.	7	MO	1700's	1972	1972	1	O	Tailings disposal for lead mining	Lead	Final	MOD981126899
38	CHEROKEE COUNTY	7	KS	~1870	1970	1970	1	M	Mining (a/k/a Tri-State mining district)	Lead, zinc	Final	KSD980741862
39	MADISON COUNTY MINES	7	MO	1700's	1970s	1970	1	M	Mining (mining district)	Lead	Final	MOD098633415
40	NEWTON COUNTY MINE TAILINGS	7	MO	~1850s	1950	1950	1	M	Mining (Tri-State Mining District)	Lead, cadmium, zinc	Final	MOD981507585
41	OMAHA LEAD	7	NE	1870s	1996	1996	1	O	Smelting/**Processing**	Lead	Final	NESFN0703481

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	Site Name	EPA Region	State	Year Start	Year End	Year End	Design/Approval 1 - pre 1970 2 - 1970 - 1989 3 - 1990 and later	Mining/Milling or Other Processing	Type of Activity	Minerals	NPL Status	Site/CERCLIS ID Number
42	ORONOGO-DUENWEG MINING BELT	7	MO	1848	late 1960s	1967	1	M	Mining (Tri-State Mining District)	Lead, cadmium, zinc	Final	MOD980686281
43	SOUTHWEST JEFFERSON COUNTY MINING	7	MO	early 1800s		1975	1	M/O	Historic mining district, smelting	Lead, zinc, barium	Final	MON000705443
44	WASHINGTON COUNTY LEAD DISTRICT - FURNACE CREEK	7	MO	1799	1980s (historic)	1980	1	M/O	Mining, milling, smelting	Lead, barite (barite 1926 - 1980s)	Final	MON000705842
45	WASHINGTON COUNTY LEAD DISTRICT - OLD MINES	7	MO	1700s		1980	1	M/O	Mining, milling, smelting			MON000705027
46	WASHINGTON COUNTY LEAD DISTRICT - POTOSI	7	MO	1700s		1980	1	M/O	Mining, milling, smelting			MON000705023
47	WASHINGTON COUNTY LEAD DISTRICT - RICHWOODS	7	MO	1700s		1980	1	M/O	Mining, milling, smelting			MON000705032
48	ACM SMELTER AND REFINERY	8	MT	1892	1972	1972	1	O	Smelting, refining/**Processing**	Copper, zinc	Final	MTD093291599
49	ANACONDA CO. SMELTER	8	MT	late 1800s	1980	1980	1	O	Smelting/**Processing**	Copper	Final	MTD093291656
50	BARKER HUGHESVILLE MINING DISTRICT	8	MT	1879	1970s	1970	1	M	Mining (only brief activity in 1940s, 1920s, and 1960s)	Silver, lead	Final	MT6122307485
51	BASIN MINING AREA	8	MT	late 1800s	1960s	1960	1	M	Mining (intermitent into 1960s)	Precious metals	Final	MTD982572562

Table 1

Summary - Mining and Milling Sites on the National Priorities L

Source: EPA AML - Status = "Final" as of May 2013 Update (list check April 21, 2

The EPA AML program defines AMLs as:

"Those lands, waters, and surrounding watersheds contaminated or scarred by extraction, beneficiation or processing of ores and minerals, including phosphate but not coal*. Abandoned mine lands include areas where mining or processing activity is temporarily inactive."

	Site Name	EPA Region	State	Year Start	Year End	Year End	Design/Approval 1 - pre 1970 2 1970 - 1989 3 - 1990 and later	Mining/Milling or Other Processing	Type of Activity	Minerals	NPL Status	Site/CERCLIS ID Number
52	CALIFORNIA GULCH	8	CO	1895 (Yak Tunnel	Early 1980s	1980	1	M	Mining, processing, smelting	Gold, silver, lead, zinc	Final	COD980717938
53	CAPTAIN JACK MILL	8	CO	1860	1992	1992	1	M	Mining, milling	Gold, silver	Final	COD981551427
54	CARPENTER SNOW CREEK MINING DISTRICT	8	MT	1880s	1931	1931	1	M	Mining (last mine closed 1931 with intermittant mining after that)	Silver, lead, zinc	Final	MT0001096353
55	CENTRAL CITY, CLEAR CREEK	8	CO	1880s	active (limited)	2011	1	M	Mining District, any current operations small) (Includes Argo Tunnel draining 30+ inactive mines)	Gold	Final	COD980717557
56	DAVENPORT AND FLAGSTAFF SMELTER:	8	UT	1870	1875	1875	1	O	Smelting/Processing	Lead, silver	Final	UTD988075719
57	DENVER RADIUM SITE	8	CO	1915	1920s	1920	1	O	Processing (35 sites of Ra disposal)	Radium	Final	COD980716955
58	EAGLE MINE	8	CO	1880s	1984	1984	1	M	Mining	Gold, silver	Final	COD081961518
59	EAST HELENA SIT	8	MT	1888	2001	2001	1	O	Smelter/Processing	Lead, zinc	Final	MTD006230346
60	EUREKA MILLS	8	UT	1870	1958	1958	1	M/O	Mining and Milling	Gold, silver, lead, copper, arsenic	Final	UT0002240158
61	FLAT CREEK IMM	8	MT	1909	1953	1953	1	M/O	Mining and Milling	Silver, gold, copper, zinc, iron	Final	MT0012694970

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	Site Name	EPA Region	State	Year Start	Year End	Year End	Design/Approval 1 - pre 1970 2 1970 - 1989 3 - 1990 and later	Mining/Milling or Other Processing	Type of Activity	Minerals	NPL Status	Site/CERCLIS ID Number
62	GILT EDGE MINE	8	SD	1876	1998	1998	1,2	M	Mining (1986 DENR permit for open pit with CN heap leach operations).	Gold, copper, tungsten	Final	SDD987673985
63	INTERNATIONAL SMELTING AND REFINING	8	UT	1910	1972	1972	1,2	O	Smelter/**Processing**	Copper, lead, zinc	Deleted (10/11/2011	UTD093120921
64	JACOBS SMELTER	8	UT	1870s	1970	1970	1	O	Smelting/**Processing**	Silver	Final	UT0002391472
65	LIBBY ASBESTOS SITE	8	MT	1920 - start of large scale mining	1990	1990	1	M	Mining	Vermiculite	Final	MT0009083840
66	LINCOLN PARK (Cotter Mill, Canyon City, Colorado)	8	CO	1958		1979	1	O	Milling	Uranium, vandadium	Final	COD042167858
67	MIDVALE SLAG	8	UT	1871	1971	1971	1	O	Smelting/Milling**Processing**	Lead, copper	Final	UTD081834277
68	MILLTOWN RESERVOIR SEDIMENTS/Clark Fork	8	MT	1870s	1980	1980	1,2	M	Mining and Smelter (possible source of As also could be landfill as source) (120 miles of sediments above reservoir)	Copper	Final	MTD980717565
69	MONTICELLO MILL TAILINGS (USDOE)	8	UT	1942	1960	1960	1	M	Milling	Vanadium, uranium	Final	UT3890090035
70	MOUAT INDUSTRIES	8	MT	late 1950s	1973	1973	1	O	**Processing**	Chromium	Final	MTD021997689

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	Site Name	EPA Region	State	Year Start	Year End	Year End	Design/Approval 1 - pre 1970 2 1970 - 1989 3 - 1990 and later	Mining/Milling or Other Processing	Type of Activity	Minerals	NPL Status	Site/CERCLIS ID Number
71	NELSON TUNNEL/COMMODORE WASTE ROCK	8	CO	1889	1985 (historic hard rock mine)	1985	1,2	M	Mining	Silver, lead, zinc	Final	CON000802630
72	SILVER BOW CREEK/BUTTE AREA	8	MT	~1870s	1963	1963	1	M	Mining, milling and smelting (contamination of 24 stream miles by industrial, ag, and municipal)	Copper	Final	MTD980502777
73	STANDARD MINE	8	CO	1874	1974	1974	1	M	Mining	Silver	Final	CO0002378230
74	SUMMITVILLE MINE	8	CO	1870	1992	1992	1,2	M	Mining (1984 - CN Heap Leach)	Gold, silver	Final	COD983778432
75	U.S. MAGNESIUM	8	UT	1972	Active	2013	1,2	O	**Processing**	Magnesium (from brine)	Final	UTN000802704
76	UPPER TENMILE CREEK MINING AREA	8	MT	1870	1930s	1930	1	M	Mining district	Gold, lead, zinc, copper	Final	MTSFN7578012
77	URAVAN URANIUM PROJECT (UNION CARBIDE CORP.)	8	CO	1912	1984	1984	1,2	O	**Processing**	Radium, uranium, vandaium	Final	COD007063274
78	VASQUEZ BOULEVARD AND I-70	8	CO	1870s	1950s	1950	1	O	Smelting (smelting center for Rocky Mountain west)/ **Processing**	Gold, silver, copper, lead, zinc	Final	CO0002259588
79	ATLAS ASBESTOS MINE	9	CA	1963	1979	1979	1	M/O	Mining/Mill	Asbestos	Final	CAD980496863

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	Site Name	EPA Region	State	Year Start	Year End	Year End	Design/Approval 1 - pre 1970 2 1970 - 1989 3 - 199 and later	Mining/Milling or Other Processing	Type of Activity	Minerals	NPL Status	Site/CERCLIS ID Number
80	CARSON RIVER MERCURY SITE	9	NV	late 1800s	~1950s (sporadic small mining after this)	1950	1	O	Milling(multiple mills (75) along Carson River; used Hg amalgam reactions)	Gold, Silver	Final	NVD980813646
81	IRON KING MINE - HUMBOLDT SMELTER	9	AZ	late 1800s, 1906	1969 (mining, 1960s (smelter)	1969	1	M/O	Mining, smelter/**Processing**	Lead, gold, silver, zinc, copper	Final	AZ0000309013
82	IRON MOUNTAIN MINE	9	CA	1860s	1963	1963	1	M	Mining	Silver, gold, coper, zinc, iron	Final	CAD980498612
83	KLAU/BUENA VISTA MINE	9	CA	1868	1970	1970	1	M/O	Mining, milling	Mercury	Final	CA1141190578
84	LAVA CAP MINE	9	CA	1861	1943	1943	1	M	Mining (historical CN plant)	Gold, silver	Final	CAD983618893
85	LEVIATHAN MINE	9	CA	1860s	1962	1962	1	M	Mining	Sulfur	Final	CAD980673685
86	SULPHUR BANK MERCURY MINE	9	CA	1865	1957	1957	1	M	Mining	Sulfur, mercury	Final	CAD980893275
87	BLACK BUTTE MINE	10	OR	1890	1960s	1960	1	M	Mining	Mercury	Final	OR0000515759
88	BUNKER HILL MINING & METALLURGICAL COMPLEX	10	ID	1880s	1981	1981	1	M/O	Mining, milling, smelting**Processing**	Lead, zinc	Final	IDD048340921
89	COMMENCEMENT BAY, NEAR SHORE/TIDE FLATS	10	WA	1890s	1985 (smelter closed)	1985	1	O	Smelter (also pulp mill, and chemical industries)/ **Processing**	Lead, copper	Final	WAD980726368

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	Site Name	EPA Region	State	Year Start	Year End	Year End	Design/Approval 1 - pre 1970 2 1970 - 1989 3 - 1990 and later	Mining/Milling or Other Processing	Type of Activity	Minerals	NPL Status	Site/CERCLIS ID Number
90	EASTERN MICHAUD FLATS CONTAMINATION	10	ID	1944	Active	2013	1	O	**Processing**	Phosphate	Final	IDD984666610
91	FORMOSA MINE	10	OR	1910	1937	1993	1	M	Mining	Copper, zinc, thorium	Final	ORN001002616
92	FREMONT NATIONAL FOREST/WHITE KING AND LUCKY LASS URANIUM MINES (USDA)	10	OR	1955	mid-1960's	1960	1	M	Mining	Uranium	Final	OR7122307658
93	KAISER ALUMINUM (MEAD WORKS	10	WA	1942	Active?	2013	1	O	**Processing** (Aluminum Reduction) (1942 - 1978 on site disposal of pot linings)	Aluminum	Final	WAD000065508
94	MIDNITE MINE	10	WA	1955	1981	1981	1	M	Mining	Uranium	Final	WAD980978753
95	MONSANTO CHEMICAL CO. (SODA SPRINGS PLANT	10	ID	1952	Active	2013	1	O	**Processing**	Phosphate	Final	IDD081830994
96	REYNOLDS METALS COMPANY	10	OR	1941	2000	2000	1	O	**Processing** (Primary Aluminum Reduction Plant)	Aluminum	Final	ORD009412677
97	SALT CHUCK MINE	10	AK	1915	1941	1941	1	M/O	Mining/Milling	Gold, silver, copper	Final	AK0001897602
98	TELEDYNE WAH CHANG	10	OR	1957	Active as of 2010	2013	1	O	**Processing**	Zirconium, rare earths	Final	ORD050955848
99	BLUE LEDGE MINE	9	CA	1904		1930	1	M	Mining	Copper/Zinc	Final	CAN000906063
100	NEW IDRIA MERCURY MINE	9	CA	1854	1970s	1970	1	M/O	Mining/**Processing**	Mercury	Final	CA0001500463

Technical Review of Kuipers Maest, 2006,"Comparison of predicted and actual water quality at hardrock mines: The reliability of predictions in Environmental Impact Statements"

June 28, 2013

Prepared for:

Northwest Mining Association.

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For submittal to:

EPA Docket – EPA-910-R-12-004Ba-c
"An Assessment of Potential Mining Impacts on Salmon Ecosystems of Bristol Bay, Alaska"
http://www2.epa.gov/bristolbay/current-public-involvement

CONTENTS

1 EXECUTIVE SUMMARY

The purpose of this document is to assess the accuracy of statements and review conclusions made in the report entitled "*Comparison of Predicted and Actual Water Quality at Hardrock Mines – the reliability of predictions in Environmental Impact Statements" by Ann S. Maest and James R. Kuipers, et al., December 7, 2006* (the "Kuipers Maest Report"). The Kuipers Maest Report purports to provide an assessment of the adequacy of predictions made during National Environmental Policy Act (NEPA) processes at mine sites. The authors note it was ultimately "intended to advance the practice of science, engineering and regulation related to water quality prediction, the recognition of risk, and the application of effective mitigation to hard rock mines".

The review consists of a dual effort. One effort looked at the Kuipers Maest Report to determine whether the conclusions are supported by information contained in the report. It is important for scientific reviews to allow the reader to independently verify the methodology and data cited in support of the conclusions. The other effort looked beyond the Kuipers Maest Report for important information on the history of regulatory and scientific development that is completely absent from the report and also for information on actual conditions at the study mines. The history of regulatory and scientific development is then compared against the dates of preparation of the EIS studies cited by the report.

The review of the Kuipers Maest Report finds that:

- The conclusions contained in the report are not relevant to any current mines that are being permitted, or to any future mines. Modern-day characterization and analysis techniques have changed so radically from virtually all of the studies cited by the report that it is meaningless to draw any comparison to modern-day conditions.

- The conclusions regarding water quality exceedences cannot be validated. There are virtually no data presented that support the conclusions. Where data are available, the cited exceedences are often for internal and trigger monitoring points rather than for compliance points that affect the surrounding environment and receptors.

- The data set used in the report includes historical sites, which were developed prior to modern regulations. The study also includes a preponderance of mine sites that were studied and permitted during the transition period from un-regulated activity to modern regulation.

- The report draws conclusions based upon technical work that is old, and may no longer be technically supportable or valid. There is an under-representation of mine sites which have been studied, permitted, operated, and regulated using modern-day methods.

- The case studies examined by the current review indicate that the report has serious problems in the way that data are interpreted and in the way conclusions are drawn.

- Throughout much of the report, the cited data are discussed out of context and mostly in isolation. There is no attempt to understand the conceptual model, the hydrogeological and geochemical processes involved, or the site-specific nature and layout of the mine sites discussed. Consequently, much of the data interpretation and resulting conclusions are misleading.

- The report neglects that increasing data collection and improved models and predictive methodologies contribute to refinements in predictions and site conceptual models. This despite the authors acknowledging the same in their 2005 report on state-of-the-art of predictive methods wherein they include the quote: *"The site conceptual model must be representative of the most important processes and reactions that will occur over time on the mine site, and <u>it can change with time at the mine site and as more information is collected"</u>* (Bredehoeft, 2005.)

- The report has defined "impacts" differently from most regulatory bodies with which the mining industry has to comply. The report defines an exceedence of surface or groundwater quality as any parameter above a primary or secondary surface or groundwater drinking water standard regardless of whether it is in compliance with permit conditions or regulations.

- The report argues that many of the exceedences are due to "characterization failures". However, virtually all of the EISs for the study mines cited in the report were prepared prior to the BLM guidance for water resource and rock characterization and analysis.

- The report includes very little consideration of ambient hydrogeological conditions that were present prior to the development of the mining operation, and particularly cases where modern-day mining has cleaned up older mining operations.

- It is not possible to recreate the summary statistics cited in the report using the information provided for the case study mine sites.

- Scoring systems used in the report have unrealistically low criteria to define the severity of potential impacts

2 REGULATORY FRAMEWORK

Mining regulation and NEPA compliance by the agencies has evolved throughout the period of the Kuipers Maest Report and continues to evolve today. To consider how this might have affected the preparation of NEPA documents, the history of NEPA implementation in various agencies was examined along with other important regulatory developments. Table 2.1 shows important regulatory milestones.

As Table 2.1 shows, even though NEPA was signed into law in 1970, the Council on Environmental Quality (CEQ) did not issue its first regulations until 1978 and some of its most important guidance until 1983.

The Bureau of Land Management (BLM) issued general NEPA procedures in 1970 This guidance was somewhat out of context as the BLM did not fall under the Federal Land Policy and Management Act (FLPMA) until 1976. That act, among other things, directed BLM to undertake systematic planning for management of lands under its jurisdiction. The systematic planning involved all resources on BLM-managed lands, including mining operations. The Federal Land Policy and Management Act (FLPMA) thrust BLM into the NEPA compliance realm in a major way. It was not until 1988 that the BLM issued specific NEPA guidance addressing mining, among other subjects.

The Nevada BLM, recognizing the need for well-documented NEPA analyses and standardization of procedures, issued policies, and guidance on water resource data and analysis and rock characterization beginning in 1998. In addition, Nevada BLM first issued groundwater modeling guidance in 2008. Prior to1998 there was little to no standardization for these analyses. In recognition of the ever-advancing regulatory and technical framework, BLM updates these policies and guidance regularly.

The Forest Service issued NEPA implementation procedures in 1979. Their mining regulation practices continued to evolve and guidance on mine bonding was issued in 2004.

The Army Corps of Engineers has also undergone an evolving process for regulating activities in wetlands, which is the basis for their involvement in many mining sites. In 1987 the ACOE issued a manual for delineating wetlands. This was followed by an attempt to redefine the delineation procedure in a 1989 manual that was ultimately withdrawn and the 1987 manual reinstituted. The ACOE issued NEPA implementing regulations in 1988.

Prior to passage of the Clean Water Act in 1972, there was no prohibition on discharges to surface waters. Facilities constructed prior to this were not necessarily designed to prevent discharges to surface waters. The effluent limits for metal mines were not promulgated until December 1982.

Table 2.1 NEPA and Major Regulatory Milestones

Action	What	Date	Citation
NEPA becomes law	Federal Statute	1970	42 USC 4321
CEQ Related Activities			
CEQ authorized to issue non-binding regulations	Executive order	1970	
CEQ receives authority to issue regulations	Executive order	1977	
NEPA regulations	CEQ Regulation	1978	43 FR 55990
Forty Most Asked Questions published	CEQ Guidance	1981	46 FR 18026
CEQ Guidance on NEPA regulations	CEQ Guidance	1983	48 FR 34263
BLM Related Activities			
Department of Interior NEPA Procedures	Interior Department Guidance	1970	516 DM 1-7
Federal Land Policy and Management Act	Federal Statute	1976	43 USC 1701
BLM publishes NEPA Handbook	BLM Guidance	1988	BLM Handbook H-1790-1
Nevada BLM publishes Water Resource Data and Analysis Policy	BLM Policy	1998	Nevada BLM Policy
Nevada BLM publishes Rock Characterization and Water Resource Analysis Guidance for Mining Activities	BLM Guidance	1998	Nevada BLM Guidance
Nevada BLM publishes Groundwater Modeling Guidance for Mining Activities	BLM Policy	2008	Nevada BLM Guidance
Forest Service Related Activities			
National Forest Management Act	Federal Statute	1976	16 USC 1600
Forest Service NEPA implementation procedures	Forest Service Regulation	1979	44 FR 44718
Forest Service Reclamation Bonding guidance	Forest Service Guidance	2004	USDA Forest Service April, 2004
Army Corps of Engineers Related Activities			
Clean Water Act	Federal Statute	1972	33 USC 1251
Directive to protect wetlands	Executive Order	1977	Executive Order 11990
ACOE Wetland Regulations	ACOE Regulation	1977	
Wetlands Delineation Manual	ACOE Technical Manual	1987	US ACE Wetlands Delineation Manual, 1987
ACOE Procedures for Implementing NEPA	ACOE Regulation	1988	53 FR 3127
Other Related Developments			
Effluent limitations for metal mines promulgated under Clean Water Act	EPA Regulation	1982	47 FR 54609
CERCLA Enacted	Federal Statute	1980	42 USC 9601
SARA Enacted	Federal Statute	1986	42 USC 11001

Prior to the enactment of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) in 1980, there was little, if any, indication of groundwater standards developing under law. The SARA amendments in 1987 clarified that drinking water standards would be applied at CERCLA sites, indicating that avoiding discharges to groundwater was necessary to avoid CERCLA enforcement.

Thus, prior to 1972 for surface water, and 1987 for groundwater, there were no meaningful targets or limitations for mine designers to use for mitigation design, or for EIS evaluations to use for comparative purposes.

The point of this discussion is that NEPA compliance and mining regulation, while still evolving today, was in its infancy during the 1970s and 1980s. The mining industry and the principal Federal mining regulatory agencies (BLM, Forest Service, and ACOE) were working in an unsettled environment during this period, including rapidly changing statutes and regulations and rapidly evolving technical processes.

3 TECHNICAL FRAMEWORK

3.1 Background

The application of scientific hydrology studies to mine sites can be traced back to the 1950s. However, the majority of the work prior to the mid-1980s was focused on specific engineering issues that related mostly to mine dewatering or water supply. A real awareness of potential surface and groundwater contamination issues associated with industrial developments only started in the late 1970s and 1980s.

The United States and Canada were among the first countries to adopt environmental procedures for mine sites and other industrial developments. Mining companies typically started to employ on-site and corporate environmental officers from the late 1980s. However, many of the early mining environmental staff had limited technical background because of the inherent lack of experience associated with this new discipline.

In the 1990s, the hard rock mining industry became highly proactive in response to the increasing environmental regulation and guidelines, and rapidly developed in-house environmental expertise and corporate governance to a higher standard. The mining industry led the development of procedures and standards for surface and groundwater ahead of many other industrial sectors.

All of the major mining companies now have a high level of environmental awareness, both at a corporate level and at an operations level. In many countries, the environmental standards imposed on a project by the mining company itself are typically more rigorous than those demanded by local regulations.

Both hydrogeology and geochemistry models are only as good as input data available to represent the system under investigation. Development of a proper conceptual model is fundamental for any meaningful numerical analysis. Until the 1990s, the available input data for the predictive tools for estimating how rocks behave under weathering was based upon relatively crude test work with no real-world monitoring. The use of case studies and site monitoring experience to provide the ability to calibrate and validate modeling procedures within the past 10 years has been fundamental for establishing the current-day procedures.

The establishment of procedures by Federal and State regulators has only become commonplace since the late 1990s and early 2000s as a result of the improved technical understanding gained by the agencies. Most of the guidance for geochemistry testing for NEPA documents were developed starting in the late 1990s (Table 2.1).

As a result, scientifically-supported EIS documents have only been available since the mid to late 1990s. Many of the EIS studies that were carried out prior to the mid-1990s used procedures which are now superseded, and they did not include the concepts of uncertainty and mitigation. Therefore, it is only in the last 10 to 15 years or so that higher quality EIS studies have become available with substantially improved predictive protocols.

3.2 Hydrogeologic modeling

Current-day methods and procedures for predictive technical studies for mine sites are vastly different to those that were utilized ten or more years ago. Groundwater modeling codes were first developed in the 1980s but were not widely applied to mine sites until the late 1980s and early 1990s. There was virtually no groundwater modeling to support EIS documents until the early 1990s. Early groundwater models for mine sites were generally un-validated because of the lack of historic data to provide input or to calibrate the models. Furthermore, the early models were basic and did not focus on developing a proper conceptual model, and they did not typically include the present-day concepts of sensitivity, uncertainty and mitigation. It was not until the mid to late-1990s that representative groundwater models were applied in support of EIS studies, and the concept of uncertainty and mitigation was introduced into the forward model predictions.

3.3 Geochemical testing and modeling

A practical understanding of the environmental geology of mineral deposits has only really developed within approximately the last 15 years. A good knowledge of the geology is critical for achieving a realistic conceptualization of processes effecting surface and groundwater quality impacts, which the predictive studies are attempting to model. The early laboratory testing procedures for geochemistry characterization did not recognize some of the physical and chemical controls that are now known to influence the testing results, and therefore some the early laboratory results were poorly constrained.

Although procedures for geochemistry characterization and modeling were developed somewhat later than those for hydrology studies, they have also evolved significantly over the past decade as good validation data for the models have become available. The first site geochemistry characterizations that approached modern-day standards occurred in the mid-1990s. However, these early studies had no basis for comparing the theoretical laboratory characterization results with actual mobilization and transport of chemical constituents.

“Predicting Water Quality at Hard Rock Mines”, nominally a peer reviewed report on models, methods and state-of-the-art hydrological and geochemical prediction techniques, states “Predictive modeling of water quality at mine sites is an evolving science with inherent uncertainties” (Kuipers Maest, 2006). The report further notes the study brings together information on water quality predictions at mine sites with approaches developed primarily in the United States, Canada, and Australia, especially in the last 10 years.

This information is consistent with the Kuipers Maest Report (page 85), which states “EISs performed after about 1990 should have more reliable information on water quality impact potential than those EISs completed before this time” and “The availability of geochemical characterization data affects the ability to determine the potential for mines to release contaminants to water resources”. With this in mind, the evolution of the geochemical and hydrologic evaluations in earlier NEPA documents (late 1970s to early 1990s) would be expected to be less detailed and precise than an evaluation prepared for a mine after the mid-1990s.

At the Green’s Creek Mine, the 1983 EIS identified the potential for the project to degrade surface and/or groundwater as a result of potential acid drainage even though no specific geochemical testing was identified (USFS 1983). The 1992 Environmental Assessment (EA) for waste rock included metals analysis, acid-base accounting (ABA), synthethic precipitation leaching procedure (SPLP) and leachate modeling (USFS 1992). This testing indicated that some waste rock had the potential to produce acid, but a greater portion was acid neutralizing and no net acid production was expected. Waste rock leachate was predicted to have zinc concentrations in the range of 0.5 to 1.3 mg/l. The actual data discussion in the Kuipers Maest Report did not mention the waste rock leachate as being acidic. It did note the average zinc concentration was slightly higher than predicted at 1.65 mg/l. However, this number is in good agreement with the predictions and well below the discharge permit requirement (and secondary drinking water standard for zinc of 5 mg/l as identified in EPA, 2008).

At the Golden Sunlight Mine, despite a test indicating the ore may be acid generating, the ore body evaluated in the 1981 EIS was determined to be oxidized and common knowledge at the time was that oxide ores were non-acid generating. Therefore, no acid rock drainage (ARD) assessment or contingency plans for ARD were required by the state. According to Sandi Olsen (previously with Hard Rock Bureau of the MDEQ, personal communication 2004), Montana regulators started looking at ARD issues in about 1989 when the Golden Sunlight Mine planned to mine deep, low-grade, unoxidized ore. Subsequent evaluations correctly identified the high acid-generating potential of ore and waste rock.

3.4 Kuipers Maest Report and EISs

During the period from 1970 through the early 2000s, the passage of environmental laws lead to new regulations, which in turn spurred technical development that resulted in new regulatory guidance. It was a period of rapid (if uneven) change, which produced the current predictive modeling capabilities that are well-vetted, calibrated, and reproducible. It is likely that technical advances will continue.

Surface water quality standards were largely non-existent prior to 1972 and groundwater standards were similarly vague to non-existent until 1987. Development of predictive methodologies trailed behind these regulatory developments by 5 to 10 years. It was not until the late 1990s that predictive techniques were developed and standardized to a level that could be calibrated and verified. The Nevada BLM recognized this state of development in 1998 and began issuing guidance for technical analyses.

It is only in the last ten years or so that the mining industry has had the opportunity to monitor sites during operations and/or closure for which modeling predictions had previously been made, and therefore has had the opportunity to compare model results to reality. This has been fundamental to improving the methods and procedures for both the hydrogeology and geochemistry models to the current standard. Geochemistry databases and levels of practical understanding have only been sufficient to provide meaningful predictions since the early 2000s.

Because scientific study methods have evolved rapidly, and because the understanding of both mining operators and the regulators has greatly improved within the last 10 years or so, there is little to be gained by comparing the results of early EIS studies to actual conditions. Many mine sites have updated their previous studies, predictions, and mitigation plans using updated and more applicable analytical and predictive models. Therefore, comparison of the old EIS studies cited in the Kuipers Maest Report to actual operating conditions is misleading and is not useful for either the regulator or the general public.

There have only been a small number of new mines permitted since the adoption of modern-day procedures and standards. However, many mines are currently operating under the guidance of more recent supplementary NEPA studies or State-lead permitting, rather than the original EIS predictions. Virtually all of the mines that were cited as examples in the Kuipers Maest Report were permitted and constructed prior to the application of modern-day technical studies and modern EIS standards.

Many of the currently-operating mines in the United States and Canada are expansions of existing operations or re-development of existing Brownfield sites. In the majority of cases, the original mine development was carried out prior to the advent of baseline surface and groundwater studies, such that there is no proper baseline characterization of naturally elevated constituents, which commonly occur in the hydrologic system around mineralized areas. Many of the compliance exceedences cited in the Kuipers Maest Report are not valid because there are no baseline data upon which to compare the current conditions.

In fact, there are a large number of instances where comparatively recent mine expansions have helped the clean-up of historic sites as a result of the new standards imposed by the mining company itself. Any proper study on the environmental changes caused by mining would need to consider these aspects.

Of the 25 case studies used in the Kuipers Maest Report, only four sites were developed under current (post-1998) NEPA guidelines. The original EA and EIS documents for 21 of the case study sites were

not developed using currently-applied scientific procedures. The majority of the sites have been expanded and re-engineered since the original EIS, and the more recent studies and analyses supersede the original work that is cited in the Kuipers Maest Report. The Kuipers Maest Report has made no attempt to consider the updated environmental analysis associated with the expansions. The reason for this is not apparent as most of the data and more recent permitting documents are on file with the applicable Federal or State agency and are publically available.

Therefore, in summary:

- The Kuipers Maest Report draws conclusions based upon studies that are old and are no longer representative of current environmental permitting and predictive protocols,
- The Kuipers Maest Report makes some attempt to consider baseline conditions but rarely considers the fact that historic unregulated mining occurred at the sites,
- The Kuipers Maest Report makes no attempt to review updated studies and analysis that are publically available and supersede the original analyses,
- The Kuipers Maest Report does not include any evaluation of any EIS documents that were prepared using the modern-day rigorous analytical methods, which would be applied to any future mine development.

4 EVALUATION OF SUMMARY STATISTICS IN THE KUIPERS MAEST REPORT

4.1 Criteria used to select the case study mines

The Kuipers Maest Report contains a number of summary statistics to show the impact to surface and groundwater quality from mining. The statistics are based on the 25 case study mines, which were considered to be representative of "the distribution of general categories and water quality-related elements that are present in the larger subsets of hard rock mines in the United States". The authors note the 25 case study mines were chosen primarily due to the availability of water quality data for the "actual water quality" assessment. As stated on page 87 of the Kuipers Maest Report: "In making the final selection of mines for in-depth study, the following priorities were identified":

- Mines with long histories and NEPA documentation from new project to reclamation and closure.
- Mines with different proximities to water resources but indicating water quality impacts.
- Mines that conducted some geochemical testing, and if possible, some water quality modeling.
- Mines with different potentials to generate acid and leach contaminants to water resources.

The document also states the "list of mines that actually meet these criteria, particularly with respect to adequate reliable evaluations that have addressed water quality predictions and impacts, and are publicly available, is limited".

As noted above, it appears that including mines with water quality impacts was a priority, and the case studies were selected based on available water quality data. Therefore, the validity of the conclusions from the Kuipers Maest Report and their applicability to the mining industry in general is questionable.

4.2 Definitions

During analysis of the information to determine which mines had exceeded water quality standards, the Kuipers Maest Report used the following definitions:

Water quality impact: increases in water quality parameters measured anywhere, as a result of mining operations, whether or not an exceedence of water quality standards or permit levels has occurred.

Exceedence: (not specifically defined, but interpreted from the text as): any value above primary or secondary drinking water standards at any monitoring location within the mine property and/or within any facility (e.g., tailings solution, pit water, waste rock runoff).

These definitions are important because they are not put in context of the regulatory requirements.

The purpose of NEPA is to identify potential impacts (or effects) to the components, structures, and functioning of an affected ecosystem (NEPA Section 1508.8). Therefore, a significant effect in surface water or groundwater might be the change of classification or use of a stream or aquifer. This makes the definition used for water quality impact in the Kuipers Maest Report the most stringent imaginable. It does not take into account important facts such as whether the increase is within mining or process facilities or constitutes an environmental release, whether it results in an exceedence of a regulatory limit, or whether it results in any environmental impact (e.g., change in downstream water classification). It is a threshold so low that no significant human activity could avoid triggering it.

From a regulatory perspective, mines are required to meet water quality standards at points of compliance such as downgradient monitoring wells or the end of a surface or groundwater mixing zone. Only exceedences of standards or permit limits at or beyond the points of compliance are potentially significant from a regulatory perspective. “Exceedences” at arbitrary locations throughout the operation are not necessarily meaningful. No mention of site-specific points of compliance are made in the Kuipers Maest Report, rather all monitoring sites are considered equal. An “exceedence” would be very likely at any mine site using the definitions in the Kuipers Maest Report.

Additionally, primary and secondary standards in mineralized areas are often exceeded in baseline water quality data. The Kuipers Maest Report does consider baseline conditions. However, the discussion is peripheral and inconsistent (e.g., historic mining impacts are often not defined). “Exceedences” of standards are noted in the report even when they are attributed to baseline conditions.

4.3 Data used

The Kuipers Maest Report utilized data from the following sources:

- Operational and post-operational water quality information from old EISs, especially for the states of Alaska, Montana, and Idaho, where updated EISs were often available,

- Technical reports and water quality data from State agencies that regulate mining activities in states such as Arizona, California, Nevada and Wisconsin,

- Post-mining Engineering Evaluation/Cost Analysis (EE/CA) documents from NEPA documents from some mines (e.g., Beal Mountain, MT; Grouse Creek, ID),

- Water quality data from files at the State agencies or from reports written by agency personnel or mining company consultants for mines in Arizona, Nevada, California, and Wisconsin where situations with multiple EISs did not exist or the EIS documents did not address water quality impacts.

While the authors recognized “that additional insights might have been gained by analyzing additional water quality data for the various mine sites”, their focus was “on obtaining data that was verifiable and/or otherwise contained in prepared reports as a matter of efficiency”.

Unfortunately, with the exception of defining the NEPA document utilized in the evaluation, the sources of data cited are generic (e.g., NDEP water quality monitoring and compliance data 1999-2003) and few actual monitoring station designations or descriptions are included for specific data. As a result, no independent evaluation of the data is possible. Additionally, no agency contact names are provided, nor are mining company or consultant reports cited.

One of the basic principles of scientific work is that data and data sources must be cited to allow others to duplicate the work. Lacking these citations, the Kuipers Maest Report cannot be verified in any meaningful way.

4.4 Evaluation of summary statistics

4.4.1 Case study Mines

The Kuipers Maest Report indicated there were 183 modern era mines, with 137 of those subject to NEPA. Of those mines, 71 had EIS information (104 EIS/EAs). Twenty-five (25) mines were chosen as "case study" mines because of availability of data. This included one (1) mine in Alaska, four (4) in California, two (2) in Idaho, six (6) in Montana, seven (7) in Nevada, and one (1) in Wisconsin. The report concluded the results of detailed evaluation of the case study mines could be extrapolated to other operations.

Using Table 4.1 of the Kuipers Maest Report, the 183 mine sites were verified (no independent assessment of time of operation was conducted). Of those, it was also verified that 137 were subject to NEPA. Of those with NEPA requirements, Table 4.1 of the Kuipers Maest Report indicates NEPA documents for 78 sites were obtained, while the report text indicates 71 sites had NEPA documents that were obtained.

Table 4.1 Summary of information presented in Table 4.1 of the Kuipers Maest Report

State	# 1975-present (~2005) mines listed	% of total	Number of sites w/EIS documents	% of sites w/ EIS docs	No. of case study mines	% of case study mines
Alaska	8	4.4	7	9.0	1	4.0
Arizona	20	10.9	10	12.8	2	8.0
California	15	8.2	8	10.3	6	24.0
Colorado	9	4.9	-	-	0	0
Idaho	14	7.7	7	9.0	2	8.0
Michigan	1	0.6	-	-	0	0
Montana	15	8.2	13	16.7	6	24.0
Nevada	74	40.4	27	34.6	7	28.0
New Mexico	7	3.8	1	1.3	0	0
South Carolina	3	1.6	-	-	0	0
South Dakota	5	2.7	1	1.3	0	0
Utah	7	3.8	4	5.1	0	0
Washington	4	2.2	-	-	0	0
Wisconsin	1	0.6	-	-	1	4.0
14	**183**	**100%**	**78**	**100%**	**25**	**100%**

Table 4.1 provides a summary of information contained in Table 4.1 of the Kuipers Maest Report. According to the summary statistics gleaned from this table, California and Montana mines are over-represented while Nevada mines are under-represented. Of the 14 states listed, 7 states are represented in the case studies (50%). Of the 14 states listed, 9 were listed as having available NEPA documents (64%). One mine, Flambeau in Wisconsin, was included in the case studies, but the site was not listed in the mines with EIS documents obtained in Table 4.1. Since the discussion for Flambeau in Section 6.3.25 includes reference to the 1990 EIS, it appears the table is in error.

Table 4.1 shows significant over-representation of California and Montana mines. This leads to under-representation of mines in Nevada, by far the most active state for new mining projects (40.4% of all mines in the study), and the state where the BLM is very active in developing guidance for analysis of mining operations. The states that are over-represented in the study have long mining histories, and many of the modern mines are located within historic mining districts that have a long history of old and unregulated mining activity. Historical activities are an un-controlled variable that is not accounted for in the Kuipers Maest Report. Moreover, the report includes three CERCLA sites within the 25 case study

mines, which overstates the importance of old and “abandoned” sites and therefore skews the study results.

Considering the above statements, it is apparent that the Kuipers Maest Report has selected its study mines with significant bias towards old and unregulated sites. Therefore, it is not realistic to apply the conclusions of the report to current or future mining operations.

4.4.2 Surface and groundwater exceedences

Statements in the Kuipers Maest Report regarding the 25 case study mines include:

- 76% (19/25) had mining-related exceedences in surface water or groundwater
- 60% (15/25) had mining-related exceedences in surface water
- 64% (16/25) had mining-related exceedences in groundwater; 3 of the exceedences were related to baseline, therefore 52% (13/25) were related to mining impacts

These statistics appear to be the product of Table 7.1 of the Kuipers Maest Report: “EIS and Operational Water Quality Information for Case Study Mines.” This table actually identifies 21 of the 25 mines as having water quality exceedences, but two of the groundwater exceedences (Round Mountain and Ruby Hill) are attributed to baseline conditions. Therefore, no mining-related water quality standard exceedences were identified at the following six mines: Round Mountain (NV); Mesquite (CA); Stillwater (MT); Castle Mountain (CA); American Girl (CA); and Ruby Hill (NV). Mines with violations or alleged violations noted in the text are more indicative of mines that have had compliance problems. Compliance problems at two of these sites (Zortman/Landusky and Beal Mountain) were a result of limited initial study. A total of nine (9) significant violations were noted which brings the percentage of mines with regulatory “exceedences” down to 36% (9 of the 25 mines).

A review of conclusions regarding actual and predicated water quality for each of the 25 case study mines described in Section 6.3 of the Kuipers Maest Report was conducted. For water quality, information from the description of Actual Water Quality Conditions for each mine was pasted into a table and the term “exceedence” or “violation” (if for water quality) was highlighted. Surface water and groundwater were differentiated in the table. Sources of information, as well as period-of-record, identified in the comparison are defined where available. The evaluation tables are provided as Appendix A. The result of this exercise is that the summary statistics could not be reproduced.

If such a study were to be conducted in the future, a more accurate and more realistic determination of water quality impacts from mines would involve reviewing data for compliance points to determine if there are exceedences. Judgment would be required because an occasional reported exceedence at a compliance point may not constitute an environmental impact (which is the purpose of reviewing projects under NEPA).

If the mines are separated by dates of initiation of mining, the percentage of case study mines with violations before 1970 is 100%, while those after 1990 is 0%. This is illustrated in Table 4.2.

Table 4.2 Violations/alleged violations at case study mines

Date	Name of Mine	Operations Started	Violation(s)/ Alleged Violations Noted*	Regulations Enacted
Pre-1970	Ray Mine, Arizona	1948	(2/2) **100%**	
	Bagdad, Arizona	1960		
1970s	Black Pine, Montana	1974	(1/3) **33%**	NEPA (1970 Clean Water Act (1972)
	Round Mountain, Nevada	1977		
	Zortman/Landusky, MT	1979		
1980s	Jerritt Canyon, Nevada	1980	(6/16) **38%**	CEQ NEPA Guidance (1983)
	Thompson Creek, Idaho	1983		
	Golden Sunlight, Montana	1983		
	Jamestown, California	1983		
	Greens Creek, Alaska	1984		
	Grouse Creek Idaho	1984		
	McLaughlin, California	1985		
	Mesquite, California	1985		
	Stillwater, Montana	1986		
	Florida Canyon, Nevada	1986		
	Rochester, Nevada	1986		
	Twin Creeks, Nevada	1988		
	Royal Mt King, California	1988		BC Task Force – Acid Prediction Guidance (1989)
	Beal Mountain, Montana	1989		
	Mineral Hill, Montana	1989		
	American Girl, California	1989		
1990s	Lone Tree, Nevada	1991	(0/4) **0%**	
	Flambeau, Wisconsin	1991		
	Castle Mountain, California	1992		
	Ruby Hill, Nevada	1997		

* Violations based on those alleged in the Kuipers Maest Report. No independent verification was conducted.

4.4.3 Contaminant leaching potential

The Kuipers Maest Report also defines the surface or groundwater exceedences by using the contaminant leaching potential described in one or more of the EISs, noting:

- 42% (8/19) predicted low contaminant leaching potential (but note that Table 7.1 only lists 5 (26%); 3 of the 8 included in the statistic are listed as "no information")
- 42% (8/19) predicted moderate contaminant leaching potential
- 15% (3/19) predicted high contaminant leaching potential

The contaminant leaching potential is used in this context to describe the ability of any material (e.g., pit wall, waste rock, tailings) to leach constituents. Current practice is to determine leaching potential using geochemical tests and then to compare the test results with site monitoring data to determine the actual mobility of constituents. In the Kuipers Maest Report, qualitative or calculated predictions in the EISs

were scored. Qualitative statements were scored as stated on page 50: "if the EIS statement was somewhat negative (e.g., the potential for contaminant leaching exists), the entry was scored as a 2. If metals concentrations expected from mining operations were described as "low" or as not having significant increases over background/baseline concentrations, the entry was scored as a 1. For mines with multiple EISs, the EIS with the highest potential to generate contaminants was used as the score for the mine."

The contaminant leaching potential scoring system was defined as follows:

None - No information = 0

Low – leachate does not exceed water quality standards = 1

Moderate – leachate exceeds water quality standards by 1 to 10 times = 2

High – leachate exceeds water quality standards by over 10 times = 3

The following points were stated on page 50 of the Kuipers Maest Report:

- In the scoring, contaminant leaching potential was categorized according to the unit or material with the greatest potential to produce contaminants.
- The categories and factors chosen to score and describe contaminant leaching potential are not absolute in terms of potential environmental impact because different mines used different types of leaching procedures with different solid:liquid ratios (see Maest, et al., 2005) and different approaches to qualitatively describing the contaminant leaching potential.
- The potential for contaminant leaching is predicted without considering mitigation measures.
- The Environmental Protection Agency uses the toxic chemical leach procedure (TCLP) leachate standards for hazardous waste that are based on 100 times the drinking water standards. However, it is more appropriate to use the four categories listed above as a conservative approach (environmentally protective) to gain a rough understanding of the potential for contaminant leaching from mining waste.

Since none of the data are presented in the report, nor are calculations included, no reproduction of the scores is possible. Furthermore, a realistic review of the results is made difficult because of (i) the overly conservative definition of "exceedence", (ii) the lumping all EIS data together regardless of improvements in water quality/geochemical assessment or expanded requirements for characterization with time, and (iii) the expanded regulatory requirements through time. However, based on the scoring system presented and the stated disclaimers and assumptions (bullet points above), it is apparent that the Kuipers Maest Report uses overly-conservative scorings. It is also evident that the conclusions presented in the Kuipers Maest report do not rely on recognized or standard protocols for impact assessment and do not use points of compliance.

4.5 Summary

The evaluation of the summary statistics in the Kuipers Maest report can be summarized as follows:

- The Kuipers Maest Report defines an exceedence of surface or groundwater quality as any parameter above a primary or secondary surface or groundwater drinking water standard regardless of whether it is in compliance with permit conditions. This method makes it nearly impossible for any site with shallow groundwater or nearby surface water to not exceed standards.

- It is not possible to re-create the summary statistics cited in the Kuipers Maest Report using the information provided for case study mine sites.
- The general lack of citations for data sources or monitoring locations makes it difficult to confirm or deny conclusions reached in the report.
- Data from all NEPA documents are treated equally regardless of changes in scientific methods, regulatory requirements, or stated re-assessments of information; which is clearly not appropriate for a scientific study.
- Scoring systems in the document use uncharacteristically low criteria to define the severity of potential impacts

5 REVIEW OF CASE STUDY MINES IN THE KUIPERS MAEST REPORT

5.1 Background

The purpose of this chapter is to determine whether the Kuipers Maest Report accurately characterizes the actual impacts at mine sites that were used for the case studies. This current review selected four mines from the list of 25 case study mines to assess how the case studies were handled in the Kuipers Maest Report. The mines selected were: Golden Sunlight in Montana, Ruby Hill and Round Mountain in Nevada, and Flambeau in Wisconsin. The mines were selected to provide a temporal range of permitting and alleged compliance issues, and were also sites where data could be rapidly obtained for the purpose of review.

5.2 Golden Sunlight

Golden Sunlight is an operating mine located in Jefferson County, Montana. Two (2) Final EIS documents (1981 and 1998) and a Final EA (1990) were reviewed in the Kuipers Maest Report. Additionally, references to the 2005 Draft SEIS are made since both of the authors were involved in the Multiple Accounts Analysis (MAA) for this SEIS.

The Kuipers Maest Report concludes there was a failure in prediction of acid conditions based on the 1981 EIS. It is noted that the EIS document was compiled before the advent of standardized geochemical tests. The common and accepted knowledge at that time was that oxidized ores were not acid-generating (Sandi Olsen, former head of the Hard Rock Bureau, personal communication, 2004). The 1981 pit did not go below the water table and was developed in oxidized ore. As methodologies changed, more accurate predictions were made regarding the geochemical characteristics of the mined materials. Subsequent predictions at Golden Sunlight indicated a high potential for ARD and associated impacts and appropriate mitigation measures were implemented as a result.

5.2.1 Exceedences

The Kuipers Maest Report utilized data presented in the 1998 EIS (likely the 1997 Draft EIS, which contained the data). The following "exceedences" were defined in Section 6.3.14 of the Kuipers Maest Report. Additionally, actual impacts from the Appendix B tables (Table 14.1 for Golden Sunlight) are included.

- The Kuipers Maest Report notes "the primary source of existing groundwater contamination at Golden Sunlight is the tailings impoundment. The groundwater contains cyanide and copper concentrations above standards and has required numerous mitigations.

    Discussion: It is unclear which data were used from the 1997 Draft/1998 Final EIS, therefore it is difficult to comment on the accuracy of the statement. Volume 1 of the 1997 Draft EIS, page 158, under Evaluation of Historic Seepage Impacts to Current Groundwater Quality states "impacts to groundwater downgradient of the pumpback wells

after 1990 have been greatly reduced or eliminated". One graph of total cyanide and nitrate concentrations for downgradient monitoring location, OW-4, is presented in this section. No mention of copper could be found in relation to groundwater monitoring points downgradient. Based on information in the 2011 Annual Report, copper concentrations are reduced to levels below any standard downgradient of the pumpback system indicating the pumpback system is functioning properly. The point-of-compliance for the minesite is at the downgradient end of the mixing zone, where no exceedences of any constituent have been identified since the mixing zone was established.

- According to Kuipers Maest Report, monitoring of existing waste rock dumps showed sulfide oxidation and potential for acid drainage, with some piles already producing acid drainage. Evidence shows some springs on the project site were impacted, but larger impacts to groundwater or surface water from the waste rock dumps have not been evident to date.

  Discussion: In contrast to the above statement, page 141 of Volume 1 of the 1997 Draft EIS states "No ARD is currently discharging from the waste rock dumps". The discussion continues "However, monitoring of conditions in reclaimed dumps shows that the waste rock has the geochemical potential to generate ARD and that oxidation of sulfide minerals is presently occurring due to infiltration of moisture. Monitoring data suggest that a wetting front is migrating very slowly through the dumps. The slow rate of this migration is attributed in part to efforts to limit meteoric water run-on by upslope catchments and partly to geochemical reactions, which consume or dissipate water. At present, these processes appear to be effectively limiting the production of ARD at dump toes and, therefore, its potential migration and impact on the local environment."

  The spring(s) showing impacts from the waste rock dumps were not identified by the Kuipers Maest Report. Page 147 of the 1997 Draft EIS states "Several springs in the Golden Sunlight Mine project area have chemical compositions that are strongly influenced by ARD-like solutions and have some elevated concentrations of sulfate and trace metals. These springs are considered natural..." The Kuipers Maest Report may be referring to the Midas Spring which was described on page 154 of the EIS as an intermittent spring that was possibly associated with an abandoned adit. This spring was covered by the East Waste Rock Dump and seepage is captured and sent to treatment.

With respect to the summary information regarding Golden Sunlight in Appendix B, Table 14.1:

- **Tailings**: Predicted impacts to groundwater and surface water were listed as "slight" in the 1981 EIS (incorrectly identified as the 1983 EIS in this table), 1990 EA, and 1998 EIS. Actual Impacts for tailings were identified as:

  - 1990 EA: Contamination of cyanide and copper in downgradient wells
  - 1998 EIS: Continued contamination of cyanide and copper in dowgradient wells
  - Water Quality Monitoring: Capture not 100% efficient due to operational problems

  Discussion: The cyanide and copper contamination issue was previously discussed. Monitoring results in the 2010 Annual Report indicate a consistent downgradient decline in all constituents associated with the tailings impoundment release. The Montana DEQ routinely recommends 80% capture efficiency for predictions.

- **Waste Rock**: Potential impacts to groundwater and surface water, based on more accurate geochemical predictions of the 1990s, were considered significant. Mitigations were proposed for potential impacts, as required by NEPA. No actual impacts were

noted in the Kuipers Maest Report, although it was noted "springs near east waste rock dump and pore water in all waste rock dumps indicate long-term acid drainage and metals leaching impacts."

> Discussion: The impact to springs was previously addressed. The mine identified the waste dumps as having a high potential to impact surface and groundwater without mitigation. Therefore, the actual conditions are consistent with predicted conditions.

- **Open Pit**: The predicted impact to pit water was not considered in the 1981 EIS because the pit was above the water table. Subsequent EA/EISs predicted the pit water would be characteristic of ARD. The mitigation for the pit is pumping into perpetuity. Therefore, the actual impacts are the same as the predicted impacts.

5.2.2 Summary

In summary, for the Golden Sunlight Mine:

- Golden Sunlight prepared its first EIS in 1981, before the advent of standardized methods for the prediction of ARD and before the requirement for any extensive evaluations. The proposed pit was above the natural water table, and was in oxidized rock.

- Predicted impacts in subsequent EA/EIS documents correctly predicted the high potential for ARD generation and associated impacts to groundwater and surface water.

- No exceedences have occurred at the point-of-compliance for groundwater.

- No impacts to surface water quality have been identified.

5.3 Ruby Hill

The Ruby Hill mine is located in Eureka County, Nevada and has been in operation since 1997. An EIS was completed in 1997 and the Kuipers Maest Report summarizes the water quality predictions. Subsequently, an SEIS was completed in 2005 to predict potential impacts associated with deepening the pit below the groundwater table.

5.3.1 Exceedences

The Kuipers Maest Report noted that water quality monitoring and compliance data were obtained from the Nevada Department of Environmental Protection (NDEP) for the period 1997-2003. The 2005 DEIS (BLM, 2005) also summarized water quality at the site. Nine groundwater monitoring locations were noted for the site.

The following "exceedences" were alleged in Section 6.3.23 of the Kuipers Maest Report:

- "Only two constituents had substantially high concentrations: arsenic and nitrate. Two wells had high arsenic concentrations, often exceeding MCL values by two to four times; concentrations increased by about 20% between 1996 and 2003. However, the highest concentration occurred upgradient of the mine.

- Elevated pH values were also common in groundwater wells. Nitrate concentrations frequently approached the MCL in several wells. The 2005 EIS suggested these predated the mine and were due to septic systems. There were lead exceedences (less than twice the drinking water standard) during the fourth quarter of 1997 and the first

quarter of 1998 in monitoring well MW-4, although no problems were recorded after this point. Since the exceedences did not recur, it did not result in any action by NDEP.

Water quality impacts were not expected and did not occur. Therefore, assuming that the exceedences are related to baseline conditions, the water quality predictions were accurate.

Discussion: Underground mining has occurred in the vicinity of the Ruby Hill mine since the early 1900s. The long un-regulated history of underground mining activity in the Eureka Mining District has resulted in complex baseline water quality conditions at the site. The alleged exceedences do not substantiate any potential impacts due to recent mining activity because they did not recur and they were related to pre-existing groundwater conditions.

The 1997 and 2005 EIS documents provide a good characterization of the baseline conditions, and the Kuipers Maest Report supports that the predicted and observed conditions at the Ruby Hill mine were accurate. As a result of the predictions, mitigation measures were implemented successfully, and in a timely manner, to reduce arsenic concentrations in the dewatering discharge, thus facilitating use of the Rapid Infiltration Basins to return the water from the dewatering system back to the water resources of the Diamond Valley groundwater basin.

5.3.2 Summary

The Ruby Hill mine provides a good example of the current adequacy of the NEPA process with regard to EIS document preparation after the late 1990's.

5.4 Round Mountain

Round Mountain is an operating mine in Nye County, Nevada. The mine has been in operation since 1977 and EAs were completed for mine expansions in 1987 and 1992. The Kuipers Maest Report provides a summary of the water quality predictions that were reviewed for the 1996 EIS, which was conducted to support the mine milling and tailings expansions.

For the evaluation of actual water quality conditions, the Kuipers Maest Report utilized water quality monitoring and compliance data obtained from the Nevada Department of Environmental Protection (NDEP) for the period 1999-2003. Data from ten groundwater monitoring locations were reviewed for the site.

5.4.1 Exceedences

Exceedences of aluminum, fluoride, iron, lead, manganese, and TDS in groundwater were reported in Section 6.3.22 of the Kuipers Maest Report. The report states that: "the cause of the exceedences in groundwater is not known, but could be due to background groundwater quality and/or discharge from the tailings or heap leach facilities or dewatering water. Because the waste rock was shown to have a significant potential to leach contaminants, the fact that there is relatively little groundwater contamination indicates the mitigation may be working. However, there are trends that cannot be explained by assuming that all exceedences are background. Fluoride is the biggest issue especially since it is a constituent of concern for leaching from the waste rock. It suggests that the baseline water quality was not adequately determined."

Discussion: Examining the 1996 EIS, there appears to be adequate discussion and supporting data to address the occurrence of elevated fluoride with respect to baseline water quality. The document states that "The chemical composition of shallow alluvial water samples at the site may be a result of mixing Tertiary volcanic, geothermal, and recharge waters in different proportions. Elevated concentrations of fluoride in samples

from the shallow alluvial monitoring wells in the southern and western portions of the site suggest an influence from geothermal water"; and also "Deeper groundwater in the vicinity of the geothermal wellfield (Table 3-9, GS-1, 2, 5 and J-2) had elevated fluoride and arsenic concentrations as well as elevated pH and temperature values. Samples from shallow alluvial and deeper geothermal waters in this area of the project site all had fluoride concentrations exceeding the Federal secondary maximum contaminant level of 2.0 milligrams per liter and ranged as high as 27.5 mg/l". (Round Mountain Mine EIS, February 1996)

5.4.2 Summary

The Round Mountain case study provides an example of how the Kuipers Maest Report has failed to properly analyze the hydrology, and has therefore misrepresented the monitoring data. Per the 1996 EIS and supporting studies, the baseline concentrations and source of fluoride in the groundwater system (in the vicinity of the Round Mountain Mine area) have been adequately documented. The Kuipers Maest Report has omitted this documentation and has therefore misrepresented the site conditions and impacts. On-going monitoring at the site supports a high fluoride concentration anomaly in the area of the documented geothermal resource area, which remains within the mine POO boundary. The elevated fluoride concentration associated with the geothermal resource will remain within the capture zone of the post closure pit lake, which will constitute a permanent hydrogeologic sink.

5.5 Flambeau

The Kennecott Flambeau Mine is located in Rusk County in northwestern Wisconsin. The mine encompassed 181 acres, with the pit covering about 35 acres. During its 4+ year mine life (1993 to 1997), the mine produced 181,000 tons of copper, 334 ounces of gold and 3.3 million ounces of silver. Ore was shipped via rail for processing at a mill in Ontario, Canada. The Kuipers Maest Report, in Section 6.3.25, incorrectly identifies the Flambeau Mine as an open pit lead and zinc mine with flotation processing, operating from 1991 to 1995.

A certificate of completion and bond release was issued in 2007 for 149 acres of the reclaimed site. In association with the City of Ladysmith, four miles of walking trails have been developed on the reclaimed site and 10 miles of equestrian trails have been developed adjacent to the mine site and the Flambeau River. Additionally, at the request of the City of Ladysmith, 32 acres of the mine site were set aside for a business and recreation park. The area has three former mine buildings occupied by tenants and provides a trailhead and parking for the adjacent equestrian trails.

Information from Table 25.1 in the Kuipers Maest Report is compared to information presented in the 2009 Annual Report for the mine. The Annual Report was available online at www.flambeaumine.com.

5.5.1 Exceedences

The Kuipers Maest Report utilized monitoring and compliance data for the period 2000 to 2003 obtained from the 2003 Annual Report, Groundwater and Surface Water Trends. One surface water monitoring location and four groundwater monitoring locations were used. The following exceedences were alleged in the Section 6.3.25 of the report:

- "Four monitoring wells in the backfilled pit showed exceedences of drinking water MCLs or secondary standards for iron (up to 12 mg/l), manganese (up to 37 mg/l), pH (as low as 6.1), sulfate (up to 1,700 mg/l) and total dissolved solids (up to 3,400 mg/l). One in-pit well showed continued increasing or elevated concentrations of iron, sulfate, TDS, and manganese; other wells showed decreasing concentrations. Groundwater elevations were higher in the backfilled pit than they were between the pit and the river, so water potentially flows from the pit to the river. After groundwater elevations returned to pre-mining levels, concentrations of iron, manganese, sulfate and TDS increased and pH decreased. Values for pH before pumping began were quite

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variable (5.8 - ~8.3). Concentrations appeared to peak in 2000 and were slowly decreasing for manganese (from a high of over 5,000 µg/l), sulfate (from a high of almost 700 mg/l) and TDS (from a high of ~1,300 mg/l), but are continuing to increase for iron (up to ~6 mg/l). Zinc concentrations were variable and still (as of 2003) ~700 µg/l (Lehrke, 2004)."

> Discussion: Increases in some parameters in groundwater in the backfill were predicted as noted. The in-pit wells are not compliance points. The pit is the area of the mine where the system was designed to re-equilibrate and was not required to have parameters below groundwater drinking water standards. Therefore, the pit water referred to by the Kuipers Maest Report is actually in compliance with regulation.

- "Although concentrations in surface water up and downgradient of the mine showed no temporal water quality trends, a report from the Great Lakes Indian Fish and Wildlife Commission stated that water quality parameters measured have changed from those measured during mine operation, and that the change makes it impossible to compare during- and post-mining water quality (Coleman, 2004). In addition, the report states that the downstream sample site SW-2 is located above the discharge point for surface water coming from the southeast portion of the mine site and therefore may not capture all releases from the mine."

> Discussion: No surface water impacts have been detected in the Flambeau River. Historical data from the 2009 Annual Report show the mine has measured field pH, conductivity, copper, hardness, and zinc from 1991 onward. Iron, manganese and sulfate were added to the constituent list in November 1999. Trend analyses show declining levels of copper and zinc.

5.5.2 Summary

In summary, for the Flambeau Mine:

- The Kuipers Maest Report does not state that in-pit wells are not compliance points and infers that the elevated constituent values represent compliance excedances,

- Surface water data indicate the Flambeau River is not impacted by mine activities.

6 CONCLUSIONS

The key conclusions from this review of the Kuipers Maest Report are as follows:

- The findings of the report are not relevant to any current mines that are being permitted, or to any future mines. Current characterization and analysis techniques have changed so radically from virtually all of the studies cited by the Kuipers Maest Report that it is meaningless to draw any comparison to current predictive evaluation protocols or permitting requirements and conditions.

- The conclusions regarding water quality exceedences cannot be validated. There are virtually no data presented by the Kuipers Maest Report that support the report conclusions. Where data are available, the cited exceedences are often for internal and trigger monitoring points rather than for compliance points that affect the surrounding environment and receptors.

- The data set used in the Kuipers Maest Report includes historical sites, which were put into production before any regulatory constraints even existed. The report also includes a preponderance of mine sites that were studied and permitted during the transition period from un-regulated activity to current regulation, before predictive protocols existed. The study draws conclusions based upon technical work that is old, and may no longer be technically supportable or valid. There is an under-representation of modern mine sites, which have been studied, operated and regulated using modern-day methods.

- The four case studies examined by the current review have highlighted that the Kuipers Maest Report has serious problems in the way that data are represented and interpreted, and in the way conclusions are drawn. The report merely extracts data without trying to understand the conceptual model of the mine site in question, the hydrogeological and geochemical processes involved, or the site-specific nature and layout of the site. Consequently, much of the data interpretation is out of context, so it is not surprising that the resulting conclusions are misleading.

- The Kuipers Maest Report neglects to discuss that increasing data collection and improved models and predictive methodologies contribute to refinements in predictions and site conceptual models. This despite the authors acknowledging the same in their 2005 report on state-of-the-art of predictive methods wherein they include the quote: *"The site conceptual model must be representative of the most important processes and reactions that will occur over time on the mine site, and <u>it can change with time at the mine site and as more information is collected"</u> (Bredehoeft, 2005).*

- The Kuipers Maest Report has defined "impacts" differently from most regulatory bodies with which the mining industry has to comply. The report defines an exceedence of surface or

groundwater quality as any parameter above a primary or secondary surface or groundwater drinking water standard regardless of whether it is in compliance with permit conditions.

- The Kuipers Maest Report argues that many of the exceedences are due to “characterization failures”. However, virtually all of the EISs for study mines cited in the report were prepared prior to the BLM guidance for water resource and rock characterization and analysis. Within the context of current analytical techniques, the conclusion has no validity.

- The Kuipers Maest Report includes very little consideration of ambient hydrogeological conditions that were present prior to the development of the mining operation, and particularly cases where modern-day mining has cleaned up older mining operations.

- It is not possible to re-create the summary statistics cited in the Kuipers Maest Report using the information provided for case study mine sites. Scoring systems used in the document have unrealistically low criteria to define the severity of potential impacts.

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Appendix A

Review of Golden Sunlight and Flambeau Mines

Information Presented in Appendix B of the Kuipers Maest Report

Responses to Table 14.1 – Summary of Potential, Predicted and Actual Impacts and Mitigations at the Golden Sunlight Mine, Montana: Groundwater and Surface Water						
Resource	**Source**	**Potential Impacts**	**Mitigations**	**Predicted Impacts**	**Actual Impacts**	**RESPONSE: Actual Impacts**
1981 EIS						
Groundwater and Surface Water	Tailings	Geochemical tests indicate ARD potential but site indications used to suggest low actual potential Potential for contamination of groundwater from tailings solution containing cyanide	Facility design to prevent ground-water and surface water impacts: ○ use of finger drains ○ clay liner ○ cutoff trench ○ impervious nature of the underlying sediments	Risk to groundwater "slight"	None listed	An additional mitigation listed in the EIS was the construction of downstream monitoring wells. Monitoring wells were required even though monitoring systems were optional at that time unless pollutants were "likely to reach surface waters or present a substantial risk to public health" – ARM 16.20.633 (4). The EIS noted groundwater impacts were viewed as possible due to "a drainage system failure or irregularities in the underlying soil materials…" Because of its chemistry, cyanide was not viewed as a significant problem, although the EIS noted heavy metals were a "potentially greater concern." Data through time have indicated continual declines in downgradient constituents. No parameters are above designated levels at the mixing zone boundary.
	Waste Rock	Same as above	No mitigations identified as needed	Risk from ARD "minimal"	WQ Monitoring: No actual impacts noted to date although springs near East waste rock dump and pore water in all waste rock dumps indicated long-term ARD and metals leaching impacts	In 1981, the agencies generally viewed oxidized rock as non-acid generating. Widespread guidance for prediction of ARD using static and kinetic testing was not available until the late-1980s. Subsequent evaluations utilized relevant guidance and it was determined waste rock had a high acid generating potential. There was an analysis for the 1981 EIS that indicated acid generating potential, but observational data suggested ARD

Responses to Table 14.1 – Summary of Potential, Predicted and Actual Impacts and Mitigations at the Golden Sunlight Mine, Montana: Groundwater and Surface Water						
Resource	**Source**	**Potential Impacts**	**Mitigations**	**Predicted Impacts**	**Actual Impacts**	**RESPONSE: Actual Impacts**
						would not be an issue. No seepage from the waste rock dump complexes is evident today, although it is anticipated based on analyses in subsequent EISs. While baseline data are limited, a 1980 water sample was collected from a spring located north of the proposed impoundment (now known as Tailings Impoundment No. 1). The pH was 5.48 with TDS of 533 mg/l and a sulfate concentration of 315 mg/l. Pre-historic ferricrete formation at the site indicates a long history of acidic water from the strongly mineralized area. The spring(s) referenced are not defined, but acidic seeps were present before placement of the East Waste Rock Dump. The Midas seep is described in detail in the 1997 Draft EIS.
Groundwater, Surface Water and Pit Water	Open Pit	Pit not expected to go below groundwater level	No mitigations identified as needed	No impacts to water quality	WQ Monitoring: Monitoring of pit water indicates ARD characteristics	The pit analyzed in the 1981 EIS did not extend below the natural groundwater table and there was no pit water. Pit water was analyzed in subsequent environmental assessments when the pit would extend below the natural water table. The ARD characteristics of the pit walls and pit water resulted in plans to capture all pit discharge for treatment.
1990 EA						
Groundwater and Surface Water	Tailings	Potential for ARD and metals in leachate	Capture of contaminated groundwater	Prevent contamination from becoming	Contamination of cyanide and copper in	The accidental release from TI#1 is discussed under the 1981 "Tailings" section. Tailings Impoundment No. 2

Responses to Table 14.1 – Summary of Potential, Predicted and Actual Impacts and Mitigations at the Golden Sunlight Mine, Montana: Groundwater and Surface Water						
Resource	**Source**	**Potential Impacts**	**Mitigations**	**Predicted Impacts**	**Actual Impacts**	**RESPONSE: Actual Impacts**
			○ Slurry walls and down-gradient wells	more extensive in groundwater and protect surface water	downgradient wells	was designed with a liner and a variety of collection basins. High copper and cyanide concentrations were identified downgradient from the initial pumpback wells. Two additional rows of pumpback wells were installed and the area is maintained as a sink. Pumpback wells east of the impoundment were also installed. Captured water is routed to Tailings Impoundment No. 2. No levels of total cyanide or dissolved copper exceeding standards have been identified at the mixing zone boundary. Commitment to treat mine discharges in perpetuity.
	Waste Rock	Significant potential for ARD and metals in waste rock leachate	Capture of contaminated groundwater ○ Slurry walls and down-gradient wells Engineered covers to reduce leachate production	Mitigation to prevent significant long-term impacts from acid drainage.	No actual impacts noted to date although springs near east waste rock dump and pore water in all waste dumps indicate long-term ARD and metals leaching impacts.	See discussion below for 1998 EIS "Waste Rock." Waste rock is expected to produce acid. Commitment to treat mine discharges in perpetuity.
Groundwater, Surface Water and Pit Water	Open Pit	Significant potential for ARD and metals in leachate from open pit	Capture of contaminated pit water	Mitigations to prevent significant long-term impacts from ARD	WQ Monitoring: Monitoring of pit water indicates ARD characteristics	Pit water captured and routed to water treatment plant and impoundment. Commitment to treat mine discharges in perpetuity.
1998 EIS						
Groundwater and Surface Water	Tailings	Short-term tailings leak	Capture of contaminated	Little or no long-term impact to	Continued contamination of	The accidental release from TI#1 is discussed under the 1981 "Tailings"

Responses to Table 14.1 – Summary of Potential, Predicted and Actual Impacts and Mitigations at the Golden Sunlight Mine, Montana: Groundwater and Surface Water						
Resource	**Source**	**Potential Impacts**	**Mitigations**	**Predicted Impacts**	**Actual Impacts**	**RESPONSE: Actual Impacts**
		containing cyanide and other contaminants expected to continue	groundwater o Slurry walls and down-gradient well o Landowner buyouts o Replacement water provided	groundwater from ARD	cyanide and copper in downgradient wells Capture not 100% efficient due to operational problems	section. Tailings Impoundment No. 2 was designed with a liner and a variety of collection basins. The TI#2 east reclaim basin liner leaked in 1995. Monitoring revealed the leak and the basin liner was repaired. No evidence of leakage currently exists. A site-wide mixing zone at the permit boundary has not had any parameter exceedences including total cyanide and copper. Capture was never expected to be 100%. Typically 80% capture efficiency is used in mixing calculations. Some EIS analyses (presented in the appendices) indicated higher capture efficiencies were possible.
	Waste Rock	Significant potential for impacts from ARD and metals over long-term	Capture of contaminated groundwater o Slurry walls and down-gradient well o Installation of drains and other seepage capture devices Reclamation cover to decrease long-term potential for impacts from	Mitigations to prevent significant long-term impacts from ARD in surface water	WQ Monitoring: No actual impacts noted to date although springs near east waste rock dump and pore water in all waste rock dumps indicated long-term ARD and metals leaching impacts	The spring(s) near the East Dump are not identified. The former Midas Spring occurred in an active slump area now covered by the East Waste Rock Dump. Historically, the spring was intermittent and did not always emerge from the same location, probably due to the changing hydraulic conditions in the slump. The source of this water is still uncertain, but could be the result of discharge from the abandoned Midas Adit, which is now covered by waste rock. The drainage above the slump (to the west) may provide a catchment area for precipitation, which infiltrates into the ground and is directed into the slump, re-emerging as a contact spring. Water from the former Midas Spring is

Responses to Table 14.1 – Summary of Potential, Predicted and Actual Impacts and Mitigations at the Golden Sunlight Mine, Montana: Groundwater and Surface Water						
Resource	**Source**	**Potential Impacts**	**Mitigations**	**Predicted Impacts**	**Actual Impacts**	**RESPONSE: Actual Impacts**
			ARD			intercepted and conveyed by pipeline to the Golden Sunlight Mine mill facility. Flow measurements taken from the discharge line are low (approximately 1-3 gpm).
Groundwater, Surface Water and Pit Water	Open Pit	Pit water expected to be characteristic of ARD	Capture and treatment – no pit lake allowed to form	Mitigations to prevent significant off-site impacts from ARD	WQ Monitoring: Monitoring of pit water indicates ARD characteristics	The ARD characteristics of the pit water have been well documented. Since the pit was developed below the water table, the pit closure plan has required dewatering and treatment.

Responses to Table 25.1 (Appendix B) – Summary of Potential, Predicted and Actual Impacts and Mitigations at the Flambeau Mine, Wisconsin: Pit Leachate and Groundwater						
Resource	**Source**	**Potential Impacts**	**Mitigations**	**Predicted Impacts**	**Actual Impacts**	**RESPONSE: Actual Impacts**
1990 EIS						
Pit Backfill Leachate	Pit backfill	Pit backfill will eliminate pit waters	Backfilling to eliminate possibility of a pit lake. Liming of backfill.	Pit backfill will eliminate pit waters. Predicted leachate concentration in pit backfill was 0.014 mg/l copper, 0.32 mg/l iron, 0.725 mg/l manganese, and 1,360 mg/l sulfate	Four monitoring wells in the backfilled pit show exceedences of drinking water standards for Fe, Mn, pH SO_4, and TDS. One in-pit well shows continued increasing or elevated concentrations of Fe, SO_4, TDS, and Mn; other wells show decreasing concentrations.	Increases in some parameters in groundwater in the backfill were predicted as noted. The pit is the area of the mine where the system was designed to re-equilibrate and was not required to have parameters below groundwater drinking water standards. Annual Reports from 2005 to 2009 are available from www.flambeaumine.com. The 2009 Annual Report (Section 4.1.1) notes "SRK Consulting performed annual assessments reviewing results from the 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008 and 2009 monitoring of pore water quality. The monitoring results and assessments confirm the findings presented in the year 2000 monitoring results assessment. An annual assessment was again performed by SRK Consulting reviewing the results from the 2009 monitoring of pore water quality. The February 2010 memorandum, Flambeau Project – Backfilled Pit 2009 Monitoring Results is found in Appendix A. The results from the 2009 monitoring period generally are in agreement with the results from previous years and support the conclusions previously identified. In general, the results indicate that the objectives of the lime amendment program had been met and that any acidity that had been present in the waste rock has been neutralized. The results further indicate that concentrations of major ions in the pore water are stable. For most of the backfill porewater, sulfate concentrations are controlled by gypsum dissolution/precipitation. However, isolated zones are developing where backfill gypsum equilibrium conditions do not exist (e.g. around well MW-1014C). The results provide ample evidence that the porewater in these areas is being displaced by inflowing groundwater. For example, concentrations of sulfate and other solutes are decreasing around Well MW-1014C, without any evidence that precipitation reactions are causing the decrease.

Responses to Table 25.1 (Appendix B) – Summary of Potential, Predicted and Actual Impacts and Mitigations at the Flambeau Mine, Wisconsin: Pit Leachate and Groundwater						
Resource	**Source**	**Potential Impacts**	**Mitigations**	**Predicted Impacts**	**Actual Impacts**	**RESPONSE: Actual Impacts**
						This 2009 Annual Report also includes a map of monitoring locations, trend analyses, and statistics.
Groundwater	Pit backfill	Waste rock from the mining operation would have the potential to leach contaminants to groundwater.	High sulfur waste stockpiles and ore crushing/loading areas lined. Treatment of mine water before discharge; Liming of backfill. Settling ponds to collect runoff from low sulfur stockpiles	Slightly increased TDS, hardness, SO_4, Fe, Mn may be expected from leachate infiltration. No impacts from high sulfur stockpile, ore crushing areas. Worst-case leakage would leak into mine pit where water would be treated before discharge. Groundwater under ponds flows to pit, limiting contamination.	Samples taken from a well between the river and the pit show exceedences of drinking water standards for Fe (2.8-7.4 mg/), Mn (3.1-4.2 mg/l), pH (5.9-6.2), SO_4 (250-460 mg/l), and TDS (810-1,100 mg/l)	Section 4.1.1 of the 2009 Annual Report also states: "As part of the permitting effort for the Flambeau project, assessments were completed to determine if the reclaimed site would comply with the permitted groundwater quality standards at the compliance boundary and protect surface water quality in the Flambeau River. The original assessment relied on predicted post-mining hydrologic conditions to conclude that the Flambeau River would act as a hydrologic boundary for the pore water migrating from the pit backfill and that backfill pore water would not migrate to the downgradient compliance boundary. In addition, the original analysis showed that the flux of backfill pore water into the river would be so small relative to the flow in the river that surface water quality would not experience a measurable change. Section 2.2 of the 2009 Annual Report summarizes groundwater quality assessments as follows: "Assessments of the backfill groundwater quality have been routinely performed with the most recent being completed in January 2010. The assessments show that the regional groundwater flow, including backfill water, is flowing toward the Flambeau River as was predicted during permitting; stable conditions have been reached at depth within the backfill; manganese concentrations appear to have stabilized or are decreasing over the last three years; any acidity that had been present in the backfill has been neutralized by the limestone; sulfate concentrations in the majority of the backfill are now controlled by gypsum precipitation and dissolution; and concentrations of solutes in the backfill are stable and should not significantly increase in the future and, in fact, many are showing a decreasing trend. Further detail on

Responses to Table 25.1 (Appendix B) – Summary of Potential, Predicted and Actual Impacts and Mitigations at the Flambeau Mine, Wisconsin: Pit Leachate and Groundwater						
Resource	**Source**	**Potential Impacts**	**Mitigations**	**Predicted Impacts**	**Actual Impacts**	**RESPONSE: Actual Impacts**
						groundwater quality can be found in Section 4 of this report." Data for all wells are also provided in appendices to the 2009 Annual Report.

Message

From: Pottebaum, Nicholas D. EOP/WHO Ex. 6 - Personal Privacy
Sent: 4/17/2018 1:03:33 PM
To: Pottebaum, Nicholas D. EOP/WHO Ex. 6 - Personal Privacy
Subject: Tax Reform Update | Tax Day

Good Morning State Leaders,

Happy Tax Day! The Tax Cuts and Jobs Act is resulting in more jobs, higher wages, and relief for middle-class families. Below you will find an update on tax reform from across the country.

- PRESIDENT TRUMP OP-ED | America's Economy Is Back And Roaring And Its People Are Winning
- PRESIDENT TRUMP VISITS FLORIDA | Tax Cuts for Florida Small Businesses Roundtable
- TAX DAY | Tax Cuts Will Generate Greater Economic Opportunity for All
- GREATER OPPORTUNITY FOR WORKERS | The Tax Cuts And Jobs Act Will Help Spur More Business Growth And Job Creation, Benefiting American Workers
- REVITALIZING COMMUNITIES | The Tax Cuts And Jobs Act Will Expand Economic Opportunity In Underserved Communities
- STATE LEADERS ON OPPORTUNITY ZONES | What They Are Saying About Opportunity Zones
- PRESIDENT TRUMP VISITS WEST VIRGINIA | Tax Reform Is Paying Off For Workers and Businesses In West Virginia
- AROUND THE COUNTRY | Tax Reform Is Paying Off For Workers and Businesses
- SMALL BUSINESS | Tax Cuts Are Energizing American Employers of All Sizes

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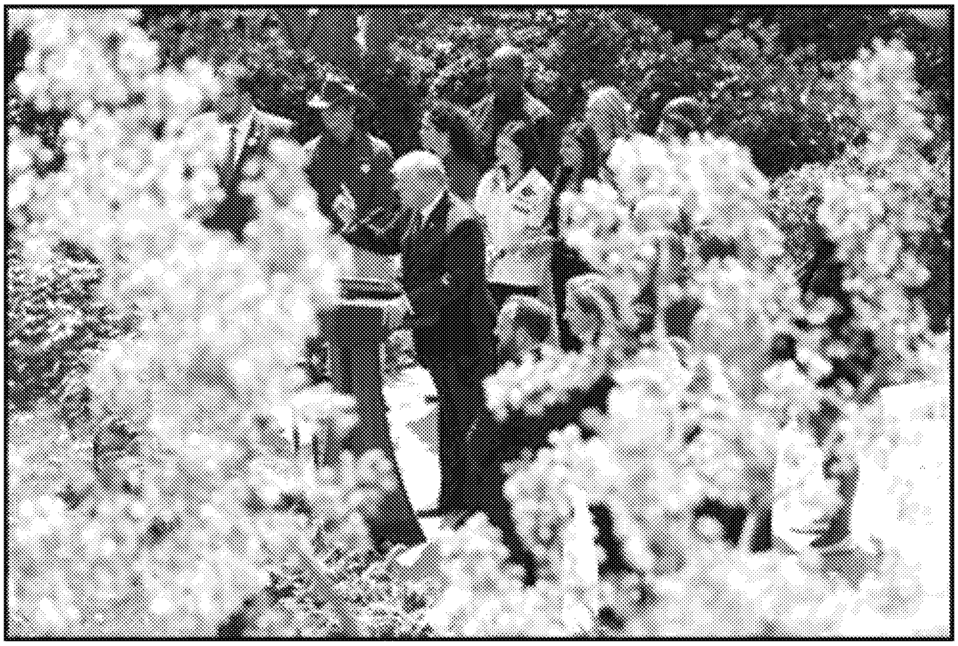
"We're fighting to give every American — all over the country, every single American — a future of dignity and purpose and of pride."

President Donald J. Trump



President Donald J. Trump, framed in the colorful blooms of the White House Rose Garden, delivers remarks on the benefits of tax reform for American workers and businesses of all sizes, Thursday, April 12, 2018, in Washington, D.C. (Official White House Photo by Shealah Craighead)

PRESIDENT TRUMP OP-ED | America's Economy Is Back And Roaring And Its People Are Winning

Tuesday is a day hardworking Americans may dread more than any other. Tax Day. A day that individuals and families, small business owners and part-time workers struggle to conquer a burdensome, complex and extremely unfair tax code to determine how much money they owe the government.

But we are changing Tax Day for Americans across the country.

This is the last year Americans will fill out outdated, complicated tax forms. In the years ahead, because I signed one of the largest tax cuts in history and the most sweeping tax reform in a generation, many Americans will complete their taxes on a simple, single sheet of paper. Remarkably, Congress had to pass this critical legislation without a single Democrat's vote.

A typical family of four earning $73,000 a year can expect to see an income tax cut of more than $2,000 when they file their tax return in 2019 — slashing their income tax bill in half. The standard deduction has been nearly doubled, so now twice as much income is earned tax-free.

The tax law also doubled the child tax credit and lowers rates across the board for hardworking families.

I made sure the IRS acted quickly to deliver some of the benefits of this tax cut legislation to Americans. As a result, Americans began to see bigger paychecks as early as February. And more savings are on the way.

America's competitive edge has also been restored. We significantly cut our corporate tax rate from one of the highest in the developed world, which means that American workers and businesses are finally able to win again against foreign competitors. We know that when American workers compete on a level playing field, American workers win.

We have already created 3 million jobs since the election — including more than 290,000 new jobs in manufacturing and more than 75,000 in mining and logging jobs.

On the announcement of my signing this historic tax reform, companies immediately started announcing thousands of new jobs and making enormous investments in their workers. Unemployment claims have reached a 44-year low. After years of wage stagnation, real wages are rising.

Apple will invest $350 billion in the U.S. economy over the next five years, including $30 billion as a direct result of the tax cuts. Fiat Chrysler announced that 2,500 jobs are coming back to near the Motor City. And millions of American workers received a tax cut bonus from their employers — pay raises, more money for retirement, or bonus checks — all because of we rolled up our sleeves, put America First, and made our tax code fairer and simpler.

The tax cut bill is also lowering the size of Americans' monthly utility bills. Major electric companies from California to Maine have credited our tax law as the reason for lowering their prices and giving consumers a break.

This year also marks the last time Americans will have to contend with Obamacare's cruel individual mandate because our tax law repealed it. These penalties largely hit lower-income and middle-class Americans — 80% of the penalties were paid by families making less than $50,000 per year.

We have also opened up the Arctic National Wildlife Refuge for energy exploration — something leaders have tried to do for decades — creating even more jobs and more energy savings. Energy exports are at a record high, and net energy imports are at their lowest level since 1982. We are at the doorstep of energy independence.

I want every American to have good jobs, rising paychecks and the opportunity to live a life of meaning, purpose and joy. That is why I insisted that the tax law also create "Opportunity Zones" that target investments in distressed communities. These Opportunity Zones will create more jobs in areas of our country that need them the most and benefit those whom Washington has too often left behind.

On this Tax Day, America is strong and roaring back. Paychecks are climbing. Tax rates are going down. Businesses are investing in our great country. And most important, the American people are winning.

Donald Trump is the president of the United States.

PRESIDENT TRUMP VISITS FLORIDA **| Tax Cuts for Florida Small Businesses Roundtable**

The White House @WhiteHouse · 17h

"And you see what's happened to your wallet when you're getting a lot more money in your weekly or monthly checks than you ever thought possible... And very importantly, it's great for the country."

Generating Greater Economic Opportunity for All

The President's full remarks can be found here.

TAX DAY | **Tax Cuts Will Generate Greater Economic Opportunity for All**

ENCOURAGING ENTREPRENEURSHIP: Small business owners will be able to grow and thrive under the Tax Cuts and Jobs Act.

- The Tax Cuts and Jobs Act will help more American entrepreneurs gain the financial footing they need to expand and invest in their futures.
    - Small businesses which organize as sole proprietorships, S corporations, and partnerships will be able to deduct 20 percent of their qualified business income.
    - Businesses will be able to fully write off the cost of capital investments for the next 5 years.
- Optimism among small business owners continues to soar following the President's signing of the Tax Cuts and Jobs Act into law.
    - Small business confidence surged to a record high following the passage of tax reform, according to a CNBC/Survey Monkey survey.
    - Optimism among small business owners remains at a historically high level, according to a National Federation of Independent Businesses (NFIB) survey from March 2018.
    - Small business optimism reached an eleven-year high in the first quarter of 2018, according to the Wells Fargo/Gallup Small Business Index.
- President Trump's tax cuts will benefit small businesses, including minority-owned businesses, which are a critical driver of our Nation's economic success.
    - Minority-owned businesses generate more than $1 trillion in economic output annually.
    - The number of minority-owned businesses is growing at a faster rate than non-minority owned businesses.
    - Nearly 8 million Americans are employed by minority-owned businesses.
- A recent survey by the Chamber of Commerce and MetLife shows that minority-owned businesses are looking forward to even more success in 2018.
    - 93 percent of minority-owned businesses expect to have a good year in 2018 according to the MetLife and Chamber of Commerce Small Business Index.
    - 71 percent of minority-owned businesses are expecting an increase in revenue in 2018.

GREATER OPPORTUNITY FOR WORKERS | **The Tax Cuts And Jobs Act Will Help Spur More Business Growth And Job Creation, Benefiting American Workers**

- Businesses are ready to expand as a result of the tax cuts and reforms signed into law by President Trump, creating more employment opportunities for those seeking work.
    - Expected employment growth for 2018 has reached an all-time high among American manufacturers, according to a National Association of Manufacturers (NAM) survey.
    - Job creation plans among small businesses remain at a historically high level according to a March 2018 survey by the National Federation of Independent Businesses.

- The Tax Cuts and Jobs Act will build upon Administration efforts to revitalize the American economy and increase economic opportunity for all.
    - More than 2.5 million jobs have been created since President Trump took office.
    - The unemployment rate has remained at a 17-year low of 4.1 percent since October of last year.
    - In 2017, Hispanic and African American unemployment rates reached their lowest levels on record.

PRESIDENT TRUMP'S **TAX CUTS**

- ***Energizing*** *American Business*
- ***Benefiting*** *Employers of All Sizes*
- ***Revitalizing*** *the Economy*

REVITALIZING COMMUNITIES **| The Tax Cuts And Jobs Act Will Expand Economic Opportunity In Underserved Communities**

- The Tax Cuts and Jobs Act includes the bipartisan Opportunity Zones Program, which will incentivize investment in economically distressed communities designated as Opportunity Zones.
    - More than 52 million low-income Americans live in communities that may benefit from the Opportunity Zones Program.
- Investments are pooled into Opportunity Funds and deployed into communities where they will help fund new and small businesses, develop blighted properties, finance construction and refurbishment, and more.
- On April 9, 2018, the Treasury Department and the Internal Revenue Service (IRS) announced the first round of Opportunity Zone designations for communities in 18 States.

Official White House Photo by *Shealah Craighead & Joyce N. Boghosian*

STATE LEADERS ON OPPORTUNITY ZONES | What They Are Saying

- **Gov. Doug Ducey (AZ):** "We applaud this federal initiative to stimulate economic development in low-income areas. Ensuring opportunity for all Arizonans has been a focus of my administration. Arizona's economy is thriving, and we are excited to see how Opportunity Zones will build on our effort." Source.
- **Governor John Hickenlooper (CO):** "Colorado's opportunity zones can help create momentum in communities that need a little boost in their economic recovery efforts. We owe it to these areas of the state to take advantage of every potential incentive. Hopefully we will see significant dividends in the future." Source.
- **Governor Kim Reynolds (IA):** "We need to take advantage of all the tools and resources we have at our disposal to spur economic growth. I am optimistic that Iowa's participation in the Opportunity Zones Program will serve as a catalyst for investment and job creation and result in prosperity for Iowa communities statewide." Source.
- **Governor Butch Otter (ID)**: "This is a great way to drive more capital investment toward Idaho neighborhoods and communities that aren't benefiting as they should from our statewide economic growth. There are no real strings attached to this market-driven tax treatment by the feds. Nobody is dictating the kind of investments the locals should pursue to promote their own prosperity." Source.
- **Governor Matt Bevin (KY)**: "The Opportunity Zones approved today by the U.S. Department of the Treasury provide one more reason for companies and businesses to consider locating in Kentucky. Kentucky will maximize this golden chance to attract economic development projects to communities most in need across the commonwealth, and the Kentucky Opportunity Zone Initiative will strengthen and rebuild both rural and urban areas. Whether along the Mississippi River in West Kentucky, throughout West Louisville's neighborhoods, or in the heart of Appalachia, these zones will spur investment, growth and community development." Source.
- **State Senate President Robert Stivers (KY):** "With the designation of these new Opportunity Zones, communities most in need across our commonwealth will have a means to attract investments that create jobs, build infrastructure and increase both tax local revenue and overall economic prosperity. The Kentucky Opportunity Zone Initiative holds the promise of creating a significant and widespread positive impact for Kentuckians. I look forward to the development of these Opportunity Zones and the long-term prosperity they will bring to our state." Source.
- **State House Speaker Pro Tempore David Osborne (KY):** "Through these federal designations, the Kentucky Opportunity Zone Initiative can attract capital investments for a broad range of development projects. What this means is lower-income and distressed communities in Opportunity Zones across Kentucky stand to see new jobs created and their economies significantly improved through a variety of potential commercial, industrial, housing, infrastructure and other investment projects." Source.

- **Governor Charlie Baker (MA)**: "Our administration is committed to helping cities and towns in Massachusetts unlock opportunity for private investments and economic growth. This program will allow municipalities across the Commonwealth to work collaboratively with investors to pursue developments that address their individual and community needs." Source.
- **Gov. Rick Snyder (MI):** "These zones have the potential to help Michiganders take advantage of the full economic development potential in all corners of the state," Gov. Snyder said. "This is a unique opportunity for investors and promising news for eligible communities." Source.
- **Gov. Phil Bryant (MS):** "Opportunity Zones in Mississippi will attract significant private sector investment, help grow our state's economy and create new jobs. This program is another business advantage existing industries and new companies will find in our state." Source.
- **Governor Phil Murphy (NJ):** "I'm pleased the Treasury Department has accepted all 169 sites I proposed last month for designation as Opportunity Zones. Now, these cities and towns will have additional means to generate economic growth throughout their respective communities and, more importantly, create economic opportunities for their residents." Source.
- **Gov. Pete Ricketts (NE):** "Thanks to the Tax Cuts and Jobs Act, 20 communities across Nebraska now have another tool to help attract new investment and job opportunities. This announcement builds on the positive news we've seen from companies from Nelnet to Wal-Mart, who are reinvesting their tax cuts into their workforce through higher wages and bonuses. None of this would have been possible without the great work of Nebraska's federal delegation, which unanimously supported the tax relief bill." Source.
- **Governor Mary Fallin (OK):** "I appreciate our partnership with the U.S. Department of Treasury in making these designations. The creation of federal opportunity zones will bring new and unique opportunities to both investors and Oklahoma communities. Investors have different projects in which they are willing to invest their capital, and it is our intent to provide them with a range of opportunities. With the potential investments in these areas, we hope that poverty will be reduced, our communities will see revitalization, and that the investments will spur job creation. I also want to acknowledge the Oklahoma Department of Commerce for its work in coordinating this effort." Source.
- **Gov, Ricardo Rossello (PR):** "These zones are created to foster investment in the nation's disadvantaged communities. New investments in Opportunity Zones can receive preferential tax treatment, which will, in turn, be a boost to our economy. Our thanks to Treasury Secretary Steve Mnuchin for understanding the need of Puerto Rico to participate in these opportunities zones. Thanks also to the resident commissioner, Jenniffer González, for her work in raising awareness about the economic challenges facing the Island and collaborating so we are included as one of the territories that will benefit from this initiative." Source.
- **Gov. Henry McMaster (SC):** "We're confident that we've been able to implement a collaborative approach to designating these communities – with input from local governments across the state – that will eventually mean further private investment and economic growth in the areas that need it most." Source.
- **Governor Greg Abbot (TX):** "This program will help highlight areas of Texas that are prime for business investment, and it will serve to bring more opportunities to hardworking families across the entire state," said Governor Abbott. "As we continue to recover after Harvey, these Opportunity Zone designations will also provide a much needed boost for local communities impacted by the storm. With the potential for billions in new investment, I look forward to our state continuing to flourish, bringing further growth and opportunity to the people of Texas." Source.
- **Governor Kenneth Mapp (VI):** "These new incentives can help us attract new investments in hotel development, retail businesses and industry in our most underserved communities and can also help those looking to rebuild after the hurricanes. I would like to thank the U.S. Department of Treasury Secretary Steven Mnuchin and his team for implementing this important program." Source.
- **Governor Scott Walker (WI):** "With our newly designated Economic Opportunity Zones, Wisconsin's thriving businesses will have a new opportunity to invest in their neighbors and help our local communities. Right now, more people are employed in our state than ever before in our history, and Wisconsin is at near record lows for unemployment. These recommendations reach communities across our state – urban, rural, and tribal – that are positioned for strong and sustained growth." Source.

President Donald J. Trump is applauded at the conclusion of a roundtable discussion on tax reform, at the White Sulphur Springs Civic Center, Thursday, April 5, 2018, in White Sulphur Springs, WV. (Official White House Photo by D. Myles Cullen)

PRESIDENT TRUMP VISITS WEST VIRGINIA | Tax Reform Is Paying Off For Workers and Businesses In West Virginia

THE INTER-MOUNTAIN (ELKINS, WEST VIRGINIA): Citizens Bank Gives Bonuses to Employees

"Citizens Bank of West Virginia issued a bonus of $1,000 to each of its 66 employees recently, joining a number of U.S. companies to pass along savings from the federal tax reform to its staff.... 'One of the best investments we can make is in our employees who are dedicated to making sure our customers have great banking experiences at Citizens,' said Nathaniel S. Bonnell, president and CEO. 'This $66,000 investment demonstrates our thanks and appreciation to our team for their tireless efforts and commitment to the bank.'"

WEST VIRGINIA METRONEWS: Pence Talks Tax Reform, Applauds Worldwide Equipment Announcement in White Sulphur Springs

"Before Pence took the stage, Worldwide Equipment CEO Terry Dotson made a highly anticipated announcement…. The company's roughly 1,100 employees across their 20 locations have received bonuses, a dealership will be constructed in Charleston, SC and upgrades are coming to their existing facilities. Dotson is confident these accomplishments are a result of the recently-passed tax reform plan."

WV NEWS: W.Va. State Auditor: Tax Cuts to Save State Employees Collective $50 Million per Year

"State employees in West Virginia are collectively expected to keep an additional $50 million annually, according to State Auditor John B. 'JB' McCuskey. McCuskey attributed this savings to the passage of the Tax Cuts and Jobs Act, which will provide state employees with a reduction in their tax withholding."

AROUND THE COUNTRY | **Tax Reform Is Paying Off For Workers and Businesses**

WASHINGTON EXAMINER: GOP Tax Overhaul Will Cut Taxes for Two-Thirds of Households this Year: Analysis

"The new tax law will directly cut the taxes of nearly two-thirds of households this year, according to a new analysis released Wednesday by the nonprofit Tax Policy Center. The think tank found the individual provisions of the law signed by President Trump in December will reduce taxes for 65 percent of households in 2018..."

MARKETWATCH: Crumbs? Bonuses Tied to Trump Tax Cuts Said to Boost U.S. Incomes by $30 Billion

"Democratic leader Nancy Pelosi said ordinary Americans would only get 'crumbs' from the Trump cuts. The federal agency that does the math says those crumbs amounted to as much as $30 billion in January. The Bureau of Economic Analysis raised its estimate of how much U.S. incomes rose in the first month of the year in response to widespread reports of businesses handing out onetime bonuses after the tax cuts became law."

THE ASSOCIATED PRESS: McCormick Offers Employee Bonuses on Tax Cut Benefit

"McCormick & Co. is the latest company to offer employees bonuses, citing sweeping tax reforms that slashed corporate tax rates. The spice-maker is offering $1,000 bonuses to eligible hourly employees and says it plans to 'accelerate' wage increases, though it did not provide details. The Sparks, Maryland company will also [use] the tax cut to make investments, pay debt and benefit shareholders."

MILWAUKEE JOURNAL SENTINEL: Lower Corporate Tax Rate Projected To Save Wisconsin Utility Customers More Than $275 Million

"Customers of Wisconsin utilities are projected to save more than $275 million from the new lower rate for federal corporate taxes, based on estimates compiled by the Citizens Utility Board of Wisconsin and the Wisconsin Industrial Energy Group.... Projected taxes are included as an expense when setting utility rates and the cost is passed onto customers."

ATLANTA BUSINESS CHRONICLE: Southwire to Pay Workers $9 Million in Bonuses, Benefits Thanks to Tax Reform

"Electrical wire giant Southwire said Monday it will pay out $9 million in bonuses and benefits to employees thanks to tax reform. Carrollton, Ga.-based Southwire Co. said full-time employees in the United States, not including executives and upper management, will each receive a $1,000 bonus and full-time employees outside of the U.S. will receive an

equivalent supplement. Part-time employees will get $250 bonuses or an international equivalent. The majority of Southwire's nearly 7,500 employees will receive payments, the company said."

KENT COUNTY NEWS (CHESTERTOWN, MARYLAND): Tax Cuts Lead Dixon to Give Employee Bonuses

"Dixon Valve and Coupling Co. has announced that it is giving employees $1,000 bonuses thanks to the federal tax reform.... On March 14, Dixon announced a $1,000 bonus for each full-time American employee who had been with the company for a year 'as a direct result of the new tax law and reduced regulations'..."

WICHITA BUSINESS JOURNAL: Wichita Companies 'Reinvesting' In Employees through Tax Cut Bonuses

"Aldrich, president and CEO of Wichita Railway Services, provided his employees bonuses of $3,000 to $6,000 using funds that would have otherwise gone toward corporate income tax. The federal government's Tax Cuts and Jobs Act, signed into law in December, lowered tax rates for businesses and individuals."

SPRINGFIELD NEWS-LEADER (MISSOURI): Springfield Solar Company Hiring More Workers, Credits Trump's Tax Cut

"A Springfield solar company announced Monday it's adding 30 new jobs thanks to a corporate tax rate cut championed by President Donald Trump. According to a press release, Sun Solar employed about 100 people at the start of 2018, 17 percent of whom are U.S. military veterans."

SMALL BUSINESS | **Tax Cuts Are Energizing American Employers of All Sizes**

ENERGIZING AMERICAN BUSINESS: Optimism and plans for growth are soaring as businesses feel the benefits of President Donald J. Trump's tax cuts.

- Optimism among American manufacturers has reached unprecedented levels according to the most recent Outlook Survey from the National Association of Manufacturers (NAM).
  - Manufacturer optimism stood at 93.5 percent in the most recent survey, the second highest reading in the survey's history.
  - Projected employment growth, new capital investments, and inventory increases all reached all-time highs in the survey.

- According to the survey, manufacturers expect sales to grow over the next year at the second fastest pace on record.
- Manufacturers anticipate wages will grow at the fastest pace in 17 years.

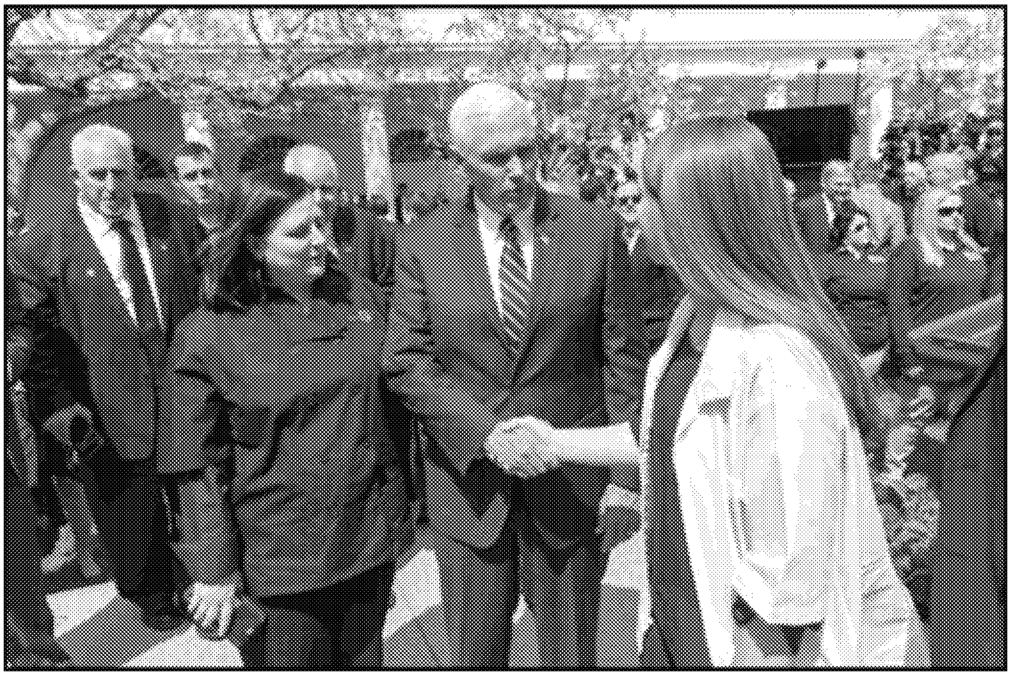
- Small businesses are worrying less about taxes and are investing more in their workers according to a National Federation of Independent Businesses (NFIB) survey from March 2018.
  - Taxes received the fewer votes as the number one problem facing small businesses for the first time since 1982.
  - The proportion of small businesses that reported raising their worker's compensation reached its highest level since 2000.
- A March 2018 survey of business executives by Ernst & Young, looking at how companies plan on using their tax savings found that:
  - 75 percent expect to expand manufacturing in the United States.
  - 89 percent plan to increase worker compensation.
  - 66 percent will likely pass on some of their tax savings to customers.
  - 69 percent expect to bring back more earnings to the U.S. from overseas than they would have otherwise.
- The Federal Reserve cited the Tax Cuts and Jobs Act as a key factor in increasing their economic projections for the United States over the next several years.

BENEFITING EMPLOYERS OF ALL SIZES: Businesses of all sizes are using their tax savings to invest in their hardworking employees.

- From small family businesses on up, American employers have been able to raise wages and increase benefits for their workers as a result of the Tax Cuts and Jobs Act.
  - More than 5.5 million hardworking taxpayers have received bonuses, pay raises, and increased benefits.
- Wichita Railway Services gave each of its five employees a tax cut bonus between $3,000 and $6,000.
- In March, Muncie Aviation Company gave its 55 full-time and 8 part-time employees a bonus due to its tax savings and 2017 business performance.
- Cox Enterprises has announced it will provide most of its nearly 60,000 employees with bonuses between $1,000 and $2,000 in April.
- McCormick & Company has announced it will provide $1,000 tax cut bonuses to eligible hourly employees in May.
- McDonald's Corporation announced it would invest $150 million in its education program which provides employees with opportunities to earn a high school diploma, college tuition assistance, and free education advising.

REVITALIZING THE ECONOMY: The Tax Cuts and Jobs Act is contributing to a healthy American economy under President Trump.

- United States gross domestic product (GDP) growth for the fourth quarter of 2017 was revised up to 2.9 percent, beating expectations.
- More than 2.5 million jobs have been added since President Trump took office.
  - 263,000 manufacturing jobs have been added.
  - 277,000 construction jobs have been added.
- The unemployment rate has remained at a 17-year low of 4.1 percent since October of last year.
- The number of Americans receiving unemployment insurance benefits has fallen to its lowest point since 1973.



“Any leader who says $1,000 in the pockets of working families is crumbs is out of touch with the American people.”

Vice President Mike Pence

Please let us know if you have any questions.

Thanks,
Nic

--
Nicholas D. Pottebaum
Associate Director
White House Office of Intergovernmental Affairs

Message

From: Ringel, Aaron [ringel.aaron@epa.gov]
Sent: 8/31/2017 8:44:36 PM
To: Cory, Preston (Katherine) [Cory.Preston@epa.gov]
Subject: FW: soft copy of hearing fact sheets
Attachments: SAC BLUE BOOK, Big Book.zip; HAC BLUE BOOK, Big Book.zip

Sent this to your old house email by accident!

-Aaron

From: Ringel, Aaron
Sent: Thursday, August 31, 2017 4:36 PM
To: Christian Palich (palich.christian@epa.gov) <palich.christian@epa.gov>; Christian Rodrick (Rodrick.Christian@epa.gov) <Rodrick.Christian@epa.gov>; Tony Frye (frye.robert@epa.gov) <frye.robert@epa.gov>; Shimmin, Kaitlyn <shimmin.kaitlyn@epa.gov>; Cory, Preston <Preston.Cory@mail.house.gov>; Troy Lyons (lyons.troy@epa.gov) <lyons.troy@epa.gov>
Subject: FW: soft copy of hearing fact sheets

All, attached are the budget fact sheet word docs from Holly you can pull info for each program office from for the nominee briefing binders. Karen and Pat have OAR's and will include in the binder as well.

Thanks,

-Aaron

From: Greaves, Holly
Sent: Thursday, August 31, 2017 4:26 PM
To: Ringel, Aaron <ringel.aaron@epa.gov>
Subject: soft copy of hearing fact sheets

Hi Aaron, please see attached for the senate and house hearing fact sheets. Both zip files have an OAR folder – I suspect there is quite a bit of overlap, but I wanted you to have a complete set.

Good luck!

Holly

Message

From: Cook-Shyovitz, Becky [Cook-Shyovitz.Becky@epa.gov]
Sent: 11/14/2017 8:42:12 PM
To: Cory, Preston (Katherine) [Cory.Preston@epa.gov]
Subject: RE: LA Attorney General Landry
Attachments: AX-17-000-5735 Paxton.pdf; 17-000-6391.pdf

Here are the Paxton letters - both of these were closed without a response.

From: Cory, Preston (Katherine)
Sent: Tuesday, November 14, 2017 3:01 PM
To: Cook-Shyovitz, Becky <Cook-Shyovitz.Becky@epa.gov>
Subject: RE: LA Attorney General Landry

Hi Becky,

Could you also please pull correspondence between the Administrator and Attorney General Paxton since this summer?

Thanks!
Preston

From: Bowles, Jack
Sent: Tuesday, November 14, 2017 10:55 AM
To: Barbery, Andrea <Barbery.Andrea@epa.gov>; Cory, Preston (Katherine) <Cory.Preston@epa.gov>; Dominguez, Alexander <dominguez.alexander@epa.gov>; Cook-Shyovitz, Becky <Cook-Shyovitz.Becky@epa.gov>
Subject: RE: LA Attorney General Landry

Hi Preston,

Becky, should be able to do a search. FYI, she is our staff liaison for AGs as well as Govs, and for letters from Govs and AGs.

Best,
Jack

From: Barbery, Andrea
Sent: Tuesday, November 14, 2017 9:53 AM
To: Cory, Preston (Katherine) <Cory.Preston@epa.gov>; Dominguez, Alexander <dominguez.alexander@epa.gov>
Cc: Bowles, Jack <Bowles.Jack@epa.gov>
Subject: RE: LA Attorney General Landry

Hi Preston –

I'm working hard to get a redline of the Strat Plan to Drew, so unfortunately won't be any use to you, today! Possible someone on Jack's staff who has access to CMS can work on this.

Also, FYI, the correspondence team in OAR should be able to handle this.

Thanks,
Andrea Barbery

Office of Intergovernmental Relations
U.S. Environmental Protection Agency
202-564-1397

From: Cory, Preston (Katherine)
Sent: Tuesday, November 14, 2017 9:47 AM
To: Dominguez, Alexander <dominguez.alexander@epa.gov>
Cc: Bowles, Jack <Bowles.Jack@epa.gov>; Barbery, Andrea <Barbery.Andrea@epa.gov>
Subject: RE: LA Attorney General Landry

Andrea and Jack- is this something y'all can help find? Thank you!

From: Dominguez, Alexander
Sent: Tuesday, November 14, 2017 9:42 AM
To: Cory, Preston (Katherine) <Cory.Preston@epa.gov>
Subject: LA Attorney General Landry

Hey Preston,

Would OCIR be able to pull any letters the Administrator has received from Louisiana Attorney General Jeff Landry as well as our responses and send those to me? In particular there should be one on Tier IV NOx emission standards but any others would be great as well. I'm asking OAR folks as well but if any other office you think I should be asking just let me know.

Thank you!

Alex Dominguez
Policy Analyst to the Principal Deputy Assistant Administrator
Office of Air and Radiation
U.S. Environmental Protection Agency

KEN PAXTON
ATTORNEY GENERAL OF TEXAS

March 7, 2017

Hon. Scott Pruitt, Administrator
U.S. Environmental Protection Agency
Office of the Administrator, 1101A
1200 Pennsylvania Avenue, N.W.
Washington D.C. 20460

Re: Request to reexamine delegation of certain environmental regulation authority to the States in accordance with the express terms of the Clean Air and Water Acts; from State of Texas, from State of Alabama, from State of Arizona, from State of Arkansas, from State of Georgia, from State of Indiana, from State of Kansas, from State of Kentucky, from State of Louisiana, from State of Mississippi, from State of Missouri, from State of Montana, from State of Nebraska, from State of Nevada, from State of North Dakota, from State of Oklahoma, from State of South Carolina, from State of West Virginia, from State of Wyoming

Dear Administrator Pruitt:

We write to call your attention to the fact that the extensive regulation from the Environmental Protection Agency during the last decade is directly at odds with the express terms and structure of the Clean Air Act and Clean Water Act. We ask that as you assess the performance of your Agency, you do so with a keen eye toward compliance with these governing laws and not repugnance to them.

These federal laws acknowledge basic truths: that the primary regulators of the environment are the States and local governments. The Clean Air Act wastes no time making this point. The very first section states that "air pollution prevention . . . and air pollution control at its source is the primary responsibility of States and local governments." 42 U.S.C. § 7401(a)(3). The Clean Air Act then establishes a preferred method for the federal government to assist States and local governments: "to provide technical and financial assistance to State and local governments in connection with the development and execution of their air pollution prevention and control programs." *Id.* § 7401(b)(3). The Act's terms such as "encourage," "assist," and "promote" envision a collaborative arrangement.[1] As one court summarized,

[1] The Clean Water Act is based on a collaborative framework that is substantially similar to the cooperative arrangement underlying the Clear Air Act. *See, e.g.*, 33 U.S.C. § 1251(b) (providing that the policy of the Clear Water Act is to preserve the "primary responsibilities of States to prevent, reduce, and eliminate" water pollution).

"[t]he great flexibility accorded the states under the Clean Air Act is ... illustrated by the sharply contrasting, narrow role to be played by EPA." *Fla. Power & Light Co. v. Costle*, 650 F.2d 579, 587 (5th Cir. 1981).

The methods we have seen from the Agency as of late, however, are in direct conflict with the cooperative arrangement the Act establishes. The Agency has replaced "encourage" and "promote" with "command" and "commandeer." Take one recent example. Texas formulated a state implementation plan for Regional Haze. That plan imposed reasonable regulations on such things as power generators in the State to ensure air quality was sufficiently high to allow good visibility. The Agency rejected the State's plan, imposed a federal plan costing $2 billion without achieving any visibility changes, and tried to insulate itself by requiring Texas to challenge the rejection of its plan in the D.C. Circuit.

Unsurprisingly, the Fifth Circuit rejected the Agency's attempt to transfer venue and stayed the federal plan.[2] At that point, the Agency had the opportunity to return to using its authority under the Act—rather than acting on its own. Instead, the Agency imposed a renewed regional haze rule almost as bad as the first.[3] These actions show that the Agency ignored the efforts of the State, perhaps blinded by the belief that good results can only result from top down management by the federal government. Or worse, the prior Administration's agenda and policy goals drove the Agency's decision rather than the requirements of the statute.

The federal government must respect the clear terms of cooperative federal-state enactments. For example, federal agencies may not add conditions on the receipt of federal funds unless the terms are clearly stated in the controlling statute. *Arlington Cent. Sch. Dist. Bd. of Educ. v. Murphy*, 548 U.S. 291, 296 (2006). And federal agencies may not stray outside the boundaries of their statutory authority by relying on policy documents and other non-statutory materials. *See, e.g., Luminant Generation Co., LLC v. EPA*, 675 F.3d 917, 931 (5th Cir. 2012).

Similarly, the federal government may interpose itself between a State and its municipal subdivisions only if Congress provides a clear directive to do so. *Tennessee v. FEC*, 832 F.3d 597, 610 (6th Cir. 2016). From our perspective, the recent overreach by the Agency amounts to a striking departure from the Clean Air and Clean Water Acts. Respectfully, we ask that you consider the steps that the Agency may take to restore the principles of cooperative federalism embodied in these important statutes.

Sincerely yours,

---

[2] *Texas v. United States Envtl. Prot. Agency*, 829 F.3d 405 (5th Cir. 2016).

[3] 82 Fed. Reg. 3,078 (Jan. 10, 2017)

Ken Paxton
Attorney General of Texas

Stephen T. Marshall
Attorney General of Alabama

Mark Brnovich
Attorney General of Arizona

Leslie Rutledge
Attorney General of Arkansas

Christopher Carr
Attorney General of Georgia

Curtis T. Hill, Jr.
Attorney General of Indiana

Derek S. Schmidt
Attorney General of Kansas

Matt Bevin
Governor of Kentucky

Jeff Landry
Attorney General of Louisiana

Phil Bryant
Governor of Mississippi

John Hawley
Attorney General of Missouri

Tim Fox
Attorney General of Montana

Douglas Peterson
Attorney General of Nebraska

Adam Paul Laxalt
Attorney General of Nevada

Wayne Stenehjem
Attorney General of North Dakota

Mike Hunter
Attorney General of Oklahoma

Alan Wilson
Attorney General of South Carolina

Patrick Morrisey
Attorney General of West Virginia

Peter Michael
Attorney General of Wyoming

cc: Hon. Jeff Sessions, United States Attorney General

KEN PAXTON
ATTORNEY GENERAL OF TEXAS

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MAR 14 2017

FCF2027230

Hon. Scott Pruitt, Administrator
U.S. Environmental Protection Agency
Office of the Administrator, 1101A
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460

KEN PAXTON
ATTORNEY GENERAL OF TEXAS

RECEIVED
2017 MAR -7 AM 11:36
OFFICE OF THE
EXECUTIVE SECRETARIAT

March 1, 2017

Hon. Scott Pruitt, Administrator
U.S. Environmental Protection Agency
Office of the Administrator, 1101A
1200 Pennsylvania Avenue, N.W.
Washington D.C. 20460

Re: Request to Suspend and Withdraw the Environmental Protection Agency's Information Collection Request for Existing Oil and Gas Facilities, EPA ICR No. 2548.01; from the State of Texas, from the State of Alabama, from the State of Arizona, from the State of Kansas, from the State of Kentucky, from the State of Louisiana, from the State of Mississippi (by and through the governor), from the State of Montana, from the State of Oklahoma, from the State of South Carolina, and from the State of West Virginia

Dear Administrator Pruitt:

We write to express our concern with the pending Information Collection Request (Request) for Oil and Gas Facilities, EPA ICR No. 2548.01, and request that it be suspended and withdrawn. The information request was issued on November 10, 2016 and requires oil and natural gas companies to provide voluminous information and survey responses in support of the Obama Administration's initiatives to impose onerous requirements upon industry to reduce emissions of greenhouse gasses, such as methane.

As you are aware, 15 States, as well as industry partners, challenged the Obama Administration's attempts to govern emissions of greenhouse gasses from a broad spectrum of new facilities within the oil and natural gas sector. *See North Dakota v. EPA*, Case No. 16-1242 (D.C. Cir.); *State of Texas v. EPA*, Case No. 16-1257 (D.C. Cir.); *State of West Virginia v. EPA*, Case No. 16-1242 (D.C. Cir.).[1] These matters were recently consolidated with pending challenges to the Obama Administration's earlier rules targeting emissions of other compounds from oil and natural gas facilities. *See Am. Petroleum Inst. v. EPA*, Case No. 13-1108, and consolidated cases. The litigation in these matters has just begun, but it relates to a common theme from the Obama Administration—the issuance of onerous regulations

[1] The States that are in this pending litigation are: Alabama, Arizona, Kansas, Kentucky, Louisiana, Michigan, Montana, North Carolina, North Dakota, Ohio, Oklahoma, South Carolina, Texas, West Virginia, and Wisconsin.

and requirements in support of an overall climate agenda targeting multiple industry sectors that will create an economic drag on our nation's economy with dubious environmental benefit. We also disagree with EPA's assumption that it possesses clear authority to regulate methane under section 111(d) of the Clean Air Act without a specific methane endangerment finding.

This information request furthers the previous administration's climate agenda and supports the next and most onerous phase of the Obama Administration's regulations targeting the oil and gas industry—the imposition of burdensome climate rules on existing sites, the cost and expense of which will be enormous. The burden of the Request is disproportionate to its benefit. We believe the EPA's requests to be an unnecessary and onerous burden on oil and gas producers that is more harassment than a genuine search for pertinent and appropriate information. Among the 114 inquiries of the Request, many state regulatory agencies already have up-to-date records and data available and responsive to many of the EPA requests. And yet the EPA has not adequately attempted to work with state agencies to develop less burdensome avenues to acquire much of the data sought. For other information sought in the Request, oil and gas producers are required to gather data and information that does not provide an environmental benefit.

The EPA's own estimates claim the industry cost of responding to the Request is about $42 million: $18 million to respond to the operator survey and $24 million to respond to the more detailed facility survey, or between $1,100 and $5,800 for each company to respond to and complete the Request. Experience indicates that the true cost and burden is undoubtedly much higher and comes at a time when the oil and gas industry is recovering from its most significant economic downturn in decades. Many of the companies can ill-afford the time and expense to comply with yet another empty regulatory burden.

We hope that the burdensome Obama climate rules never see the light of day, which is why we ask that this Information Collection Request be suspended and withdrawn. At a minimum, we suggest that the EPA: (1) grant a 180-day extension for any required response; (2) take no enforcement against companies that do not respond; (3) allow companies to use "best estimate" data and information; and (4) work with state regulatory agencies to acquire pertinent and appropriate information.

We appreciate that the Administration has many priorities and that this request may require additional deliberation. Please consider an immediate suspension of the Information Collection Request pending internal review by the EPA concerning whether it should withdraw the Request.

We appreciate your prompt consideration to this matter.

Sincerely,

Ken Paxton
Attorney General of Texas

Steven T. Marshall
Attorney General of Alabama

Mark Brnovich
Attorney General of Arizona

Derek Schmidt
Attorney General of Kansas

Matt Bevin
Governor of Kentucky

Jeff Landry
Attorney General of Louisiana

Phil Bryant
Governor of Mississippi

Tim Fox
Attorney General of Montana

Mike Hunter
Attorney General of Oklahoma

Alan Wilson
Attorney General of South Carolina

Patrick Morrisey
Attorney General for West Virginia

cc: Hon. Jeff Sessions, United States Attorney General

KEN PAXTON
ATTORNEY GENERAL OF TEXAS
Post Office Box 12548
Austin, Texas 78711-2548

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Hon. Scott Pruitt, Administrator
U.S. Environmental Protection Agency
Office of the Administrator, 1101A
1200 Pennsylvania Ave., N.W.
Washington, D.C. 20460

1101A

Message

From:	Hanson, Andrew [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=976B280C3EAF4E50B91A25D75466CF3C-HANSON, ANDREW]
Sent:	7/11/2017 5:16:03 PM
To:	Wesson, Dolores [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=500270d34ba046f48c5d8ff54746cb81-Wesson, Dol]
CC:	Christensen, Damaris [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=e04107c23c1043d6967754064c477a29-Christensen, Damaris]; Schaefer-Gomez, Julia [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d5f0868369304bef91d8aece8386fc8c-Schaefer-Go]
Subject:	RE: Updated List of Federalism Letters-Commenters 7.10
Attachments:	WOTUSFedCommentsByState.docx

Hi Dolores –

On the first, intergovernmental rather than governmental.

Ex. 5 - Deliberative Process

From: Wesson, Dolores
Sent: Tuesday, July 11, 2017 11:15 AM
To: Hanson, Andrew <Hanson.Andrew@epa.gov>
Cc: Christensen, Damaris <Christensen.Damaris@epa.gov>; Schaefer-Gomez, Julia <Schaefer-Gomez.Julia@epa.gov>
Subject: RE: Updated List of Federalism Letters-Commenters 7.10

Drew,
Before we go final with this list I have two minor questions for you:

1. Do you prefer the term “intergovernmental associations” over “governmental associations”; we have seen both in this context?
2. To be sure, we are only counting letters once, even when they are signed by multiple signatories.

We are basing this on your initial list. Otherwise we are ready to close this list.
Dolores

From: Schaefer-Gomez, Julia
Sent: Monday, July 10, 2017 4:15 PM
To: Hanson, Andrew <Hanson.Andrew@epa.gov>
Cc: Wesson, Dolores <Wesson.Dolores@epa.gov>; Christensen, Damaris <Christensen.Damaris@epa.gov>
Subject: Updated List of Federalism Letters-Commenters 7.10

Hi Drew,

Here is the updated list of federalism letters and commenters (signatures) that we have received so far, as well as updated numbers/stats. I've broken down the categories also into local government and associations, to differentiate from the state government agencies.

Thank you!

Julia Schaefer Gomez
ORISE Research Participant
U.S. Environmental Protection Agency
Ocean and Coastal Protection Division
Schaefer-Gomez.Julia@epa.gov
(202) 566-2960

WOTUS Commenters as of July 11, 2017

At a glance: **19 Governors**
2 Lieutenant Governors
20 Attorneys General (all signed one letter)
18 Intergovernmental Associations
60 cabinet-level state agencies

ALABAMA

Attorney General Steve Marshall
Alabama Department of Agriculture

ALASKA

Governor Bill Walker
Attorney General Jahna Lindemuth

ARIZONA

Governor Doug Ducey
Apache County, District 3
Eastern Arizona Counties Organization
Gila County Board of Supervisors (Cline)
Gila County Board of Supervisors (Humphrey)
Gila County Board of Supervisors (Martin)
**Gila County Board of Supervisors letter with 3 signatures
Graham County Board of Supervisors
Greenlee County Board of Supervisors
Navajo County Board of Supervisors (Thompson
Navajo County Board of Supervisors (Whiting)
Pima County

ARKANSAS

Governor Asa Hutchinson
Attorney General Leslie Rutledge
Arkansas Department of Agriculture
Benton County (judge)
Boone County (judge)
Carroll County (judge)

Craighead County (judge)
Faulkner County (justice of the peace)
Greene County (judge)
Hot Spring County (Dist 10 justice)
Logan County, (Dist 2 & 3 justice)
Logan County (Dist 5 justice)
Marion County (judge)
Mississippi County (judge)
Newton County (judge)
Poinsett County (judge)
Polk County (judge)
Pope County (Dist 6 & 9 justice)
Pulaski County (justice)
Saline County (judge)
Searcy County (clerk)
Sebastian County (judge)
Sebastian County (Dist 10 justice)
Stone County (Clerk)

CALIFORNIA

Association of California Water Agencies
California Association of Sanitation Agencies
California Department of Transportation
California Storm Water Quality Association
City of Azusa (city mgr)
City of Corona (city mgr)
City of Lake Forest (env. mgr)
City of Manteca (mayor)
City of San Juan Capistrano (city mgr)
City of Santa Ana (engineer)
Del Norte County Board of Supervisors
Elsinore Valley Municipal Water District
La Mesa (Helix) Water District
Los Angeles County Department of Public Works
Orange County Public Works
Riverside County Flood Control District
Rural County Representatives of California
San Diego County Water Authority
San Diego County Planning and Development Services
San Gabriel Valley Council of Governments
Sanitation Districts of Los Angeles County
Santa Fe Irrigation District
Santa Margarita Water District
Tuolumne County Board of Supervisors
Western Municipal Water District

COLORADO

**Joint letter: Colorado Department of Agriculture
Colorado Department of Natural Resources
Colorado Department of Public Health and Environment
City of Aurora Water Administration
Huerfano County Water Conservation District
Northwest Colorado Council of Governments
Pitkin County (attorney)

CONNECTICUT

Connecticut Department of Energy and Environmental Protection

FLORIDA

Florida Department of Agriculture and Consumer Services
Florida Department of Environmental Protection
Charlotte County Board of Commissioners

GEORGIA

Attorney General Christopher Carr
Georgia Department of Natural Resources

HAWAII

Governor David Ige

IDAHO

Governor Butch Otter **joint letter with
Idaho Department of Agriculture
Idaho Department of Water Resources
Idaho Association of Counties

ILLINOIS
Illinois Environmental Protection Agency

INDIANA

Attorney General Curtis Hill, Jr.
Indiana Department of Environmental Management
Association of Indiana Counties
County Supervisors Association of Indiana
Blackford County Surveyors
Hamilton County Surveyors
Hancock County Surveyors

IOWA

Governor Kim Reynolds **joint letter with Lt. Governor Adam Gregg
Buchanan County

KANSAS

Governor Sam Brownback
Attorney General Derek Schmidt

KENTUCKY

Attorney General Andy Beshear
Energy and Environment Cabinet (Secretary)

LOUISIANA

Attorney General Jeff Landry
Louisiana Department of Environmental Quality (Secretary)
Jefferson Parish Department of Environmental Affairs

MAINE

Governor Paul LePage

MASSACHUSETTS

Massachusetts Department of Environmental Protection

MICHIGAN

Attorney General Bill Schuette
**Joint letter: Michigan Department of Agriculture and Rural Development and
Michigan Department of Environmental Quality

MINNESOTA

**Joint letter: Minnesota Department of Natural Resources
Minnesota Pollution Control Agency

MISSISSIPPI

Governor Phil Bryant
Forrest County (supervisor)

MISSOURI

Governor Eric Greitens **joint letter with
Missouri Department of Natural Resources
Attorney General Josh Hawley

MONTANA

Montana Department of Environmental Quality, Department of Natural Resources and Conservation

NEBRASKA

Governor Pete Ricketts **joint letter with
Nebraska Department of Agriculture
Nebraska Department of Environmental Quality
Nebraska Department of Natural Resources

NEVADA

Governor Brian Sandoval
Attorney General Adam Paul Laxalt
Nevada Division of Environmental Protection
Nevada Association of Counties
Clark County Regional Flood Control District

Humboldt River Basin Authority

NEW HAMPSHIRE

Governor Chris Sununu

NEW MEXICO

New Mexico Department of Agriculture

NEW YORK

New York State Department of Environmental Conservation

NORTH CAROLINA

Lieutenant Governor Dan Forest
North Carolina Department of Environmental Quality (Secretary)

NORTH DAKOTA

Governor Doug Burgum
Attorney General Wayne Stenehjem

OHIO

Attorney General Mike DeWine
Ohio Environmental Protection Agency
Ohio Department of Transportation
Ohio Department of Agriculture
Ohio Department of Natural Resources, Division of Mineral Resources
Ohio Department of Natural Resources, Division of Oil and Gas Resources Management

OKLAHOMA

Attorney General Mike Hunter
**Joint letter: Commissioner of Agriculture
Secretary of Energy and Environment
Secretary of Transportation

OREGON

**Joint letter	Oregon Department of Environmental Quality
Oregon Department of Fish and Wildlife
Oregon Department of Forestry
Oregon Department of State Lands
Jackson County Road Department
Yamhill County Commission

PENNSYLVANIA

**Joint letter:	Pennsylvania Department of Agriculture
Pennsylvania Department of Conservation and Natural Resources
Pennsylvania Department of Environmental Protection
Pennsylvania Fish and Boat Commission
Pennsylvania Department of Transportation (nat res. staff)

SOUTH CAROLINA

Governor Henry McMaster
Attorney General Alan Wilson
Dorchester County Administrator

SOUTH DAKOTA

Attorney General Marty Jackley
South Dakota Department of Environment and Natural Resources
Pennington County Board of Commissioners

TENNESSEE

**Joint letter:	Tennessee Department of Agriculture and
Tennessee Department of Environment and Conservation

TEXAS

Attorney General Ken Paxton
Railroad Commission of Texas (All three commissioners)
Texas Commission on Environmental Quality
Texas Department of Agriculture
Texas Department of Transportation
Texas General Land Office

UTAH

Attorney General Sean Reyes
Public Lands Policy Coordination Office (director)
Duchesne County Commission

VIRGINIA

Commonwealth of Virginia Department of Agriculture and Consumer Services
Spotsylvania County (engineer)

WASHINGTON

Washington Department of Ecology

WEST VIRGINIA

Attorney General Patrick Morrisey
West Virginia Department of Environmental Protection

WISCONSIN

Attorney General Brad Schimel
Wisconsin Department of Natural Resources

WYOMING

Governor Matt Mead
Wyoming Association of Conservation Districts
Wyoming County Commissioners Association
Wyoming Department of Environmental Quality
Wyoming Coalition of Local Governments

<u>INTERGOVERNMENTAL ASSOCIATIONS</u>

***Joint Letter from the National Association of Counties, National League of Cities, U.S. Conference of Mayors**
Association of Clean Water Administrators
Association of State Floodplain Managers

Association of State Wetland Managers
Environmental Council of the States
National Association of Conservation Districts
National Association of Clean Water Agencies
National Association of State Departments of Agriculture
National Association of Flood and Stormwater Management Agencies
National Conference of State Legislatures
National Governors' Association – Gov. Edmund Brown (CA) and Gov. Matt Mead (WY)
National Municipal Storm Water Alliance
National Water Resources Association
New England Interstate Water Pollution Control Commission
Western Governors' Association – Gov. Steve Bullock (MT) and Gov. Dennis Daugaard (SD)
Western States Water Council

****Joint Letter signed by Attorneys General from 20 states**

Message

From: EPA, R6 [noreply-subscriptions@epa.gov]
Sent: 12/8/2017 9:50:42 PM
To: Cory, Preston (Katherine) [Cory.Preston@epa.gov]
Subject: EPA releases list of Superfund sites targeted for immediate, intense attention

U.S. ENVIRONMENTAL PROTECTION AGENCY
NEWS RELEASE
WWW.EPA.GOV/NEWSROOM

EPA releases list of Superfund sites targeted for immediate, intense attention

DALLAS – (Dec. 8, 2017) Today, the U.S. Environmental Protection Agency released the list of Superfund sites that Administrator Pruitt has targeted for immediate and intense attention. In Oklahoma, EPA will target the Tar Creek Superfund site. The 21 sites on the list – from across the United States – are in direct response to the Superfund Task Force Recommendations, issued this summer, calling for this list.

"By elevating these sites we are sending a message that EPA is, in fact, restoring its Superfund program to its rightful place at the center of the Agency's mission," said EPA Administrator Scott Pruitt. "Getting toxic land sites cleaned up and revitalized is of the utmost importance to the communities across the country that are affected by these sites. I have charged the Superfund Task Force staff to immediately and intently develop plans for each of these sites to ensure they are thoughtfully addressed with urgency. By getting these sites cleaned up, EPA will continue to focus on ways we can directly improve public health and the environment for people across America."

Tar Creek, a former lead and zinc mine in Ottawa County, Okla., is one of the nation's most complex Superfund sites. In addition to addressing mining waste and other environmental issues within the site, EPA's work has also included cleanup of nearby residential properties and job training for area residents. EPA has joined with partners from the state of Oklahoma and the Quapaw Tribe throughout the cleanup process, with the tribe and Oklahoma Department of Environmental Quality handling much of the oversight and cleanup work.

In developing this initial list, EPA considered sites that will benefit from Administrator Pruitt's direct engagement and have identifiable actions to protect human health and the environment. These are sites requiring timely resolution of specific issues to expedite cleanup and redevelopment efforts. The list is designed to spur action at sites where opportunities exist to act quickly and comprehensively. The Administrator will receive regular updates on each of these sites.

The list is intended to be dynamic. Sites will move on and off the list as appropriate. At times, there may be more or fewer sites based on where the Administrator's attention and focus is most needed. There is no commitment of additional funding associated with a site's inclusion on the list.

EPA remains dedicated to addressing risks at all Superfund sites, not just those on the list. The Task Force Recommendations are aimed at expediting cleanup at all Superfund sites and Administrator Pruitt has set the expectation that there will be a renewed focus on accelerating work and progress at all Superfund sites across the country.

The Task Force, whose work is ongoing, has five overarching goals:

- Expediting cleanup and remediation;
- Reinvigorating cleanup and reuse efforts by potentially responsible parties;
- Encouraging private investment to facilitate cleanup and reuse;
- Promoting redevelopment and community revitalization; and
- Engaging with partners and stakeholders.

The Task Force will provide the public with regular updates as it makes progress on the Administrator's Emphasis list and other Task Force activities

To learn more about the sites, please visit: https://www.epa.gov/superfund/superfund-sites-targeted-immediate-intense-action

Connect with EPA Region 6:

On Facebook: https://www.facebook.com/eparegion6

On Twitter: https://twitter.com/EPAregion6

Activities in EPA Region 6: http://www.epa.gov/aboutepa/region6.htm

# # #

Message

From: Cory, Preston (Katherine) [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=BFD80B15F6D04A3BA11FC8CA3C85BC50-CORY, KATHE]
Sent: 12/11/2017 9:52:19 PM
To: Katie Altshuler [katie.altshuler@gov.ok.gov]
Subject: Superfund sites listed for immediate, intense action

Hi Katie,

I am reaching out regarding the inclusion of Tar Creek (Ottawa County) Superfund Site on the Administrator's site list for immediate action. I want to emphasize that this announcement is in direct response to the Superfund Task Force Recommendations issue in July 2017. The site's inclusion on the list means that the Administrator feels it requires an expeditious resolution of a specific issue for cleanup and redevelopment, as well as his direct engagement. Furthermore, the targeting of the site does not indicate that it is most in need of federal funding. Rather, it is included because of potential site-specific action that will facilitate near-term progress. The National Priority List is forthcoming.

Should you or Governor Fallin have additional questions, please feel free to see our Q &A site on the topic, or give me a call.

Thanks,
Preston Cory

K. Preston Cory
Special Advisor
Office of the Administrator, Congressional and Intergovernmental Relations
U.S. Environmental Protection Agency
202-579-4281

Message

From: Cory, Preston (Katherine) [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=BFD80B15F6D04A3BA11FC8CA3C85BC50-CORY, KATHE]
Sent: 7/25/2017 8:41:33 PM
To: Greenwalt, Sarah [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=6c13775b8f424e90802669b87b135024-Greenwalt,]
Subject: RE: RE:
Attachments: OK-State_2017-06-19.pdf; WOTUS 2017-WGA Federalism Comments.Final.pdf

Attached! Also, here is the link for the SharePoint site where all WOTUS letters are logged:

Ex. 5 - Deliberative Process

To my knowledge, this is the only letter from OK and includes Attorney General Mike Hunter, the Commissioner of Agriculture, the Secretary of Energy and Environment, and the Secretary of Transportation.

OK is also part of the Western Governors' Association, and although Gov. Fallin did not write in independently, the WGA letter is attached as well.

Let me know if you need anything else!

Best,
Preston

-----Original Message-----
From: Greenwalt, Sarah
Sent: Tuesday, July 25, 2017 4:29 PM
To: Cory, Preston (Katherine) <Cory.Preston@epa.gov>
Subject: Re: RE:

letters that were submitted by Oklahoma during the federalism consultation.

Sent from my iPhone

> On Jul 25, 2017, at 4:27 PM, Cory, Preston (Katherine) <Cory.Preston@epa.gov> wrote:
>
> What specifically are you looking for? Still working on memos and I believe Daisy is revising talkers.
>
> -----Original Message-----
> From: Greenwalt, Sarah
> Sent: Tuesday, July 25, 2017 4:22 PM
> To: Cory, Preston (Katherine) <Cory.Preston@epa.gov>
> Subject:
>
> Hey Preston! Looking through my emails for the Oklahoma materials and can't find them. Would you please send them my way?
>
> Thanks!
>
> Sent from my iPhone